NUEXCO

Monthly Report

July 1992 **Number 287**

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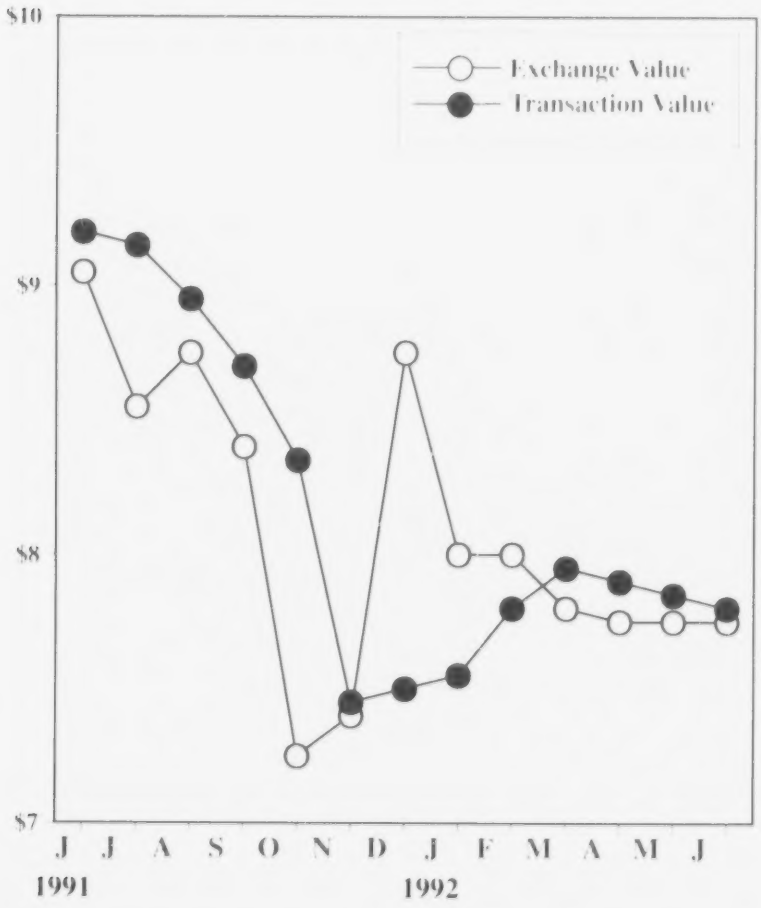

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Market activity in the first half of 1992 has proven to be much higher than anticipated. Year-to-date near-term uranium volume exceeds 22 million pounds equivalent U_3O_8 in 67 transactions, nearly equalling the record pace of 1990.

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- **Transporting Uranium Fuels–Part 2**
  Regulation, Licensing, and Documentation

This is the second half of an article intended to aid and familiarize those who depend on the transportation of nuclear fuels in their business dealings, yet rarely deal directly with transportation's complexities. This portion of the article addresses the most common regulatory and documentation issues.

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Market Values Summary

NUEXCO Market Values	This Report June 30, 1992	Last Report May 31, 1992	12 Months Ago June 30, 1991
EXCHANGE VALUE [1]	**$7.75** / lb equivalent U_3O_8	$7.75	$9.05
UF_6 VALUE [2]	**$23.60** / kg U as UF_6	$23.60	$27.25
LOAN RATE [3]	**3.0%** / annum	3.0%	3.5%
CONVERSION VALUE [4]	**$1.50** / lb U as UF_6	$1.60	$1.50
SWU VALUE [5] **(0.3 % tails assay)**	**$65** / SWU	$65	$59
TRANSACTION VALUE [6]	**$7.80** / lb equivalent U_3O_8	$7.85	$9.20
Transactions	**26**	32	24
Months	**3**	3	2
Millions of Pounds	**6.0**	7.3	6.3

DEFINITIONS

[1] The **Exchange Value** is NUEXCO's judgment of the price at which transactions for significant quantities of natural uranium concentrates could be concluded as of the date indicated.

[2] The **UF_6 Value** is NUEXCO's judgment of the price at which spot and near-term transactions for significant quantities of natural uranium hexafluoride could be concluded as of the date indicated.

[3] The **Loan Rate** is NUEXCO's judgment of the annual interest rate at which uranium loans could be concluded as of the date indicated.

[4] The **Conversion Value** is NUEXCO's judgment of the price at which spot and near-term transactions for significant quantities of conversion services could be concluded in the secondary market as of the date indicated.

[5] The **SWU Value** is NUEXCO's judgment of the price at which spot and near-term transactions for significant quantities of enrichment services could be concluded as of the date indicated.

[6] The **Transaction Value** is a weighted average price of recent natural uranium sales transactions. The calculation is based on prices paid in:

a) Transactions closed within the previous three month period for which delivery is scheduled within one year of the transaction date;

b) At least ten transactions;

c) Transactions involving a sum total of at least 2 million pounds equivalent U_3O_8.

DERIVATIONS AND COMMENTS

- All **Market Values** are expressed in terms of US$.
- All **Market Values** are based on:
  - Data from recently completed transactions.
  - Data from pending transactions.
  - Firm bids to buy or borrow, and firm offers to sell or lend.
  - Prices purchasers or rates borrowers have expressed a willingness to pay, but for which NUEXCO is not aware of firm bids to buy or borrow and prices sellers or rates lenders have expressed a willingness to accept, but for which NUEXCO is not aware of firm offers to sell or lend.
- Prices associated with deliveries under old or renegotiated contracts or other than arm's-length transactions are not included in the determination of these **Market Values**.
- In the determination of prices, NUEXCO does not consider charges for transportation other than that customarily provided by suppliers.
- The prices of services or materials delivered under long-term contracts with primary suppliers are not considered in the determination of the listed values.
- For the **SWU Value**, NUEXCO converts SWU prices at varying tails and product assays to equivalent SWU prices at a tails assay of 0.30 weight-percent (%) ^{235}U and a product assay of 3.0 weight-percent ^{235}U, assuming feed costs corresponding to the NUEXCO **Exchange Value** and **Conversion Value** determined as of the same date.
- In calculating the **Transaction Value**, NUEXCO does not account for the price of uranium delivered in connection with contracts which call for "market price" mechanisms. This exclusion applies particularly to contracts in which delivery prices are expressed as a function of future **Exchange Values** or any other indeterminate variable. Also excluded from the calculation are any other transactions in which the delivery price is defined in such a way that it can not currently be determined.
- The sample time for the **Transaction Value** is extended as necessary to satisfy the minima for the number of transactions and quantity of material. Other currencies are converted to US dollars using conversion rates in effect on or near the transaction date.

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MARKET REVIEW

JUNE MARKET REVIEW

(as of June 31, 1992)

OVERVIEW

Throughout the month of June, both buyers and sellers appeared somewhat indifferent to the preliminary determination on the anti-dumping petition released near the end of May. The June 30, 1992, Exchange Value remained unchanged at $7.75 per pound U_3O_8. The UF_6 Value also was unchanged at $23.60 per kgU as UF_6.

Ten near-term uranium transactions were reported during June, totalling more than five million pounds equivalent U_3O_8 (**Table 1**). Year-to-date uranium market volume now equals 22.4 million pounds equivalent U_3O_8 through 67 transactions. This level of activity is well ahead of 1991's half-year total of 13.5 million pounds in 57 transactions. A complete analysis of market activity during the first half of 1992 is provided in the article beginning on page 19 of this report.

The Loan Rate remained unchanged at 3.0 percent per annum. Three loans were reported, totalling more than four million pounds equivalent U_3O_8. The Conversion Value declined $0.10, to $1.50 per pound U as UF_6, as aggressive sellers continued to put downward pressure on the conversion market, particularly in the USA. Six near-term sales were reported during June, totalling more than four million pounds U of conversion services.

The SWU Value was unchanged at $65 per SWU, as the enrichment market remained fairly stable during June. Four near-term enrichment sales were reported, totalling more than 600 thousand SWU. Three of these sales involved SWU contained in enriched uranium product (EUP). In addition, one long-term enrichment sale was reported for a large quantity of SWU for 1993-1997 delivery.

Table 1
NEAR-TERM URANIUM SALES SUMMARY

	June 1992		Year-to-Date	
	No. of Sales	Volume [1]	No. of Sales	Volume [1]
Concentrates	6	2.1	42	12.7
Natural UF_6	1	<0.1	15	5.1
EUP	3	3.1	10	4.6
Total [2]	**10**	**5.3**	**67**	**22.4**

[1] Million pounds equivalent U_3O_8
[2] Due to independent rounding, columns may not equal total.

NATURAL URANIUM AND CONVERSION

Spot market uranium prices stayed within a narrow range during June, and the **Exchange Value** remained unchanged at **$7.75** per pound U_3O_8. As anticipated, market participants did not overreact to the preliminary dumping determination. When demand increased near the end of the month, due to four discretionary buyers entering the market within a few days, numerous suppliers continued to compete aggressively at levels near the June 30 Exchange Value, precluding any price increase.

The market was fairly active during June: six near-term concentrates transactions were reported, totalling nearly 2.1 million pounds U_3O_8. Utilities completed three of the June purchases; an intermediary and a uranium producer each made one. The other concentrates purchase was made by an intermediary from a producer, but it occurred earlier in 1992. Nearly all of the purchases were made by US-based companies.

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The **UF_6 Value** also was unchanged, remaining at **$23.60** per kgU as UF_6. The market for UF_6 was quiet in June, and experienced some slight downward pressure during the last half of the month as supply exceeded very limited UF_6 demand. Only one natural UF_6 transaction was reported, in which a US utility purchased a small quantity of UF_6 from an intermediary for near-term delivery.

* * *

In the **long-term uranium market**, four transactions totalling more than 3.7 million pounds equivalent U_3O_8 were reported. One utility committed to three suppliers, while an intermediary made the other purchase. All four sales involved concentrates and called for deliveries stretching from 1994 through 2004.

* * *

The **Transaction Value** decreased $0.05 for the third consecutive month, declining to **$7.80** per pound U_3O_8. This Value is based on 26 transactions over three months, involving 6.0 million pounds equivalent U_3O_8. The relative stability of the concentrates market during the past few months has caused the Transaction Value, which is calculated using a weighted, moving average, to approach the current Exchange Value of $7.75 per pound U_3O_8.

* * *

Active uranium supply dropped by 1.4 million pounds, to **6.2** million pounds equivalent U_3O_8 (**Table 2**). By month end, **active uranium demand** increased by almost one million pounds, to **2.5** million pounds equivalent U_3O_8. Nevertheless, supply has consistently emerged to meet new demand, and the **supply/demand ratio** of **2.5** illustrates that oversupply remains the dominant factor in the uranium market.

* * *

The **Loan Rate** remained unchanged at **3.0** percent per annum. Three loans were reported during June; intermediaries borrowed a total of more than four million pounds equivalent U_3O_8 from producers and a utility. All three loans could be evaluated to have occurred at a level near the prevailing Loan Rate.

* * *

The **Conversion Value** decreased $0.10, to **$1.50** per pound U as UF_6. While market conditions in Europe and the USA have created strong buyer's markets in both areas, prices are substantially higher in Europe. Suppliers have been particularly aggressive in the USA, putting even more downward pressure on the market there. In Europe, however, primary converters do not have much excess capacity and other sellers are not as active. Consequently, even though spot conversion demand is quite low in Europe, prices have not been under as much pressure as in the USA.

Six near-term transactions were reported: utilities and intermediaries purchased a total exceeding four million pounds U of conversion services from primary converters and an intermediary. Three of the sales occurred at prices slightly below the June 30 Conversion Value and three others occurred at prices higher than the June 30 Value.

Table 2
NEAR-TERM SUPPLY/DEMAND SUMMARY

	Active Supply[1]	Active Demand[1]
• Uranium (thousand lbs equivalent U_3O_8)	6,225	2,485
• Supply/Demand Ratio:	2.5	
• Loan (thousand lbs equivalent U_3O_8)	5,020	1,250
• Conversion (thousand lbs U as UF_6)	3,260	620
• SWU (thousand SWUs)	780	15

[1] Supply and Demand tables in the Market Review section of this report provide details for each category.

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ENRICHMENT SERVICES AND ENRICHED URANIUM PRODUCT

The **SWU Value** was unchanged at **$65** per SWU, as the enrichment market stabilized during June. Market volume was notable, as four near-term sales totalled well over 600 thousand SWU. Three of the sales involved EUP, and contained more than 3.1 million pounds equivalent U_3O_8 of feed. The other near-term purchase was made by an intermediary for a small quantity of SWU at a price near the June 30 SWU Value. In addition, one long-term enrichment sale was reported, in which a European utility purchased a large quantity of SWU for delivery during the period 1993 through 1997.

Table 3
ENRICHMENT PRICES
(June 30, 1992)

Prices	This Month Report 287	Last Month Report 286	12 Months Ago Report 275
NUEXCO SWU Value ($US per SWU)	65	65	59
US DOE SWU prices: ($US per SWU)			
USC	121.50[1]	121.50[1]	117.85[2]
AFC	153.00[3]	153.00[3]	153.00[3]
Requirements	157.00[3]	157.00[3]	157.00[3]
Incentive Price (IP2)	104.67[4]	104.67[4]	100.68[5]
Calculated worth of enriched UF_6[6]: ($US per KgU as UF_6)			
2.0 % ^{235}U	208	209	212
2.5 % ^{235}U	291	292	294
3.0 % ^{235}U	377	379	379
3.5 % ^{235}U	465	467	466
4.0 % ^{235}U	555	557	554
4.5 % ^{235}U	646	648	643

[1] Effective 10/1/91.
[2] Effective 10/1/89 to 9/30/91.
[3] Effective since 10/1/84.
[4] Provisional IP2 for FY92: Effective 10/1/91 to 9/30/92, for up to 30% of annual requirements.
[5] IP2: Effective 10/1/90 to 9/30/91, for up to 30% of annual requirements.
[6] Calculated using the NUEXCO Exchange Value, Conversion Value, SWU Value and 0.30 % ^{235}U tails assay.

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RECENT TRANSACTIONS

Uranium Sales[1]

NUEXCO Transaction Number	Delivery Period	Approximate Quantity (thousand pounds equivalent U_3O_8)	Price Within Percentage Range[2] of Current Exchange or UF_6 Value	Buyer	Seller	Remarks
5383	1992	301-600	See remarks	Intermediary	Producer	Occurred earlier in 1992
5464A	1992	301-600	See remarks	Utility	Intermediary	Contained in EUP
5466	1992	101-300	90-97	Intermediary	Producer	
5468A	1992-1993	1,001-3,000	See remarks	Intermediary	R	Contained in EUP
5470	1995-2004	1,001-3,000	See remarks	Utility	Producer	Price related to market
5471	1995-2004	1,001-3,000	See remarks	Utility	Producer	Price related to market
5472	1995-1999	1,001-3,000	See remarks	Utility	Intermediary	Price related to market
5474	1992	Less than 50	98-102	Utility	Intermediary	
5475	1992	Less than 50	103-110	Producer	Intermediary	
5480	1994-1996	101-300	R	Intermediary	R	
5481	1992	Less than 50	98-102	Utility	Intermediary	UF_6
5484	1992	301-600	103-110	Utility	Intermediary	
5486	1992	601-1,000	98-102	Utility	R	
5490A	1992	101-300	See remarks	Intermediary	Utility	Contained in EUP

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[1] Transactions listed are not limited to those in which NUEXCO was involved, but also include others of which NUEXCO is aware. NUEXCO may delay reporting some transactions in order to protect proprietary information.

[2] The ranges *Below 90, 90-97, 98-102, 103-110, Above 110,* represent percentages (rounded to whole numbers) of the appropriate current Exchange Value or UF_6 Value. The endpoints of each range are included within that range.

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MARKET REVIEW

RECENT TRANSACTIONS

Natural Uranium Loans[1]

NUEXCO Transaction Number	Delivery Period	Approximate Quantity (thousand pounds equivalent U_3O_8)	Price Within Percentage Range[2] of Current Loan Rate	Borrower	Lender	Remarks
5465	1992	101-300	R	Intermediary	Producer	
5467	1992	301-600	R	Intermediary	Producer	
5491	1992	3,001-6,000	98-102	Intermediary	Utility	

Conversion Sales[1]

NUEXCO Transaction Number	Delivery Period	Approximate Quantity (thousand pounds of U equivalent)	Price Within Percentage Range[2] of Current Conversion Value	Buyer	Seller	Remarks
5476	1992	601-1,000	90-97	Utility	Converter	
5482	1992	Less than 50	90-97	Utility	Converter	
5483	1992	101-300	90-97	Utility	Converter	
5485	1992	601-1,000	Above 110	Intermediary	Intermediary	
5487	1992	1,001-3,000	Above 110	Intermediary	Converter	
5488	1993	1,001-3,000	Above 110	Intermediary	Converter	

Enrichment Sales[1]

NUEXCO Transaction Number	Delivery Period	Approximate Quantity[3] (thousand SWU)	Price Within Percentage Range[2] of Current SWU Value[4]	Buyer	Seller	Remarks
5464B	1992	101-300	See remarks	Utility	Intermediary	Contained in EUP
5468B	1992-1993	301-600	See remarks	Intermediary	R	Contained in EUP
5489	1993-1997	301-600	See remarks	Utility	Enricher	Base escalated
5490B	1992	50-100	See remarks	Intermediary	Utility	Contained in EUP
5493	1992	Less than 50	98-102	Intermediary	Intermediary	

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1 Transactions listed are not limited to those in which NUEXCO was involved, but also include others of which NUEXCO is aware. NUEXCO may delay reporting some transactions in order to protect proprietary information.

2 The ranges *Below 90, 90-97, 98-102, 103-110, Above 110*, represent percentages (rounded to whole numbers) of the appropriate current Market Value. The endpoints of each range are included within that range.

3 If tails assay is unknown or unspecified, NUEXCO's calculation of SWU quantity assumes 0.30 % tails assay.

4 Prices are usually normalized to 0.30 % tails assay. When prices and SWU values are expressed as discounts from a reference price (e.g., **X** dollars less than DOE's USEC base price at time of delivery), the percentage price range is based on the discounted prices, not on the reference price.

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SUPPLY AND DEMAND

Uranium Supply

NUEXCO Project Number	Quantity (Thousand Pounds equivalent U_3O_8) Spot or Near-term [1]	Intermediate or Long-term [2]	Delivery Period	Remarks
AVAILABLE FOR SALE:				
ACTIVE				
91-1505	1,250	—	1992	
91-1507	500	—	1992	
91-1511*	1,305	—	1992	UF_6/UF_6e
91-1512*	785	—	1992	UF_6e
92-1194*	200	—	1992	
92-1501A*	1,685	—	1992	UF_6e
92-1509*	500	—	1992	U_3O_8/UF_6
91-1268	—	600 per year	1992-1999	
TOTAL	**6,225**			
INACTIVE	**3,050**			
AVAILABLE TO LOAN:				
ACTIVE				
92-1072	1,600	—	1992	UF_6
92-1077	180	—	1992	UF_6
92-1114	390	—	1992	UF_6
92-1183*	350	—	1992	
92-1187*	250	—	1992	U_3O_8/UF_6
92-1195*	250	—	1993	
92-1503	2,000	—	1992	
TOTAL	**5,020**			
INACTIVE	**1,600**			

* New or revised since last month.

[1] For delivery within one year, measured from the date of this Report. This category excludes material deliverable within one year under other than spot or near-term contracts.

[2] For delivery beyond one year, measured from the date of this Report.

Active Projects reclassified as Inactive since last month: *none*

Active Projects removed since last month: 92-1074, 92-1075, 92-1128, 92-1129, 92-1161

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MARKET REVIEW

SUPPLY AND DEMAND

Uranium Demand

NUEXCO Project Number	Quantity (Thousand Pounds equivalent U_3O_8) Spot or Near-term [1]	Intermediate or Long-term [2]	Delivery Period	Remarks
INQUIRIES TO PURCHASE:				
ACTIVE				
92-1152A	15	—	1993	UF_6e
92-1158*	450	—	1992	
92-1188*	500	—	1992	U_3O_8/UF_6
92-1189*	500	—	1992-1993	
92-1196*	520	—	1992	
92-1197*	500	—	1992	
91-1184	—	350 per year	1993-1997	
91-1197	—	2,210	1992-1997	U_3O_8/UF_6
91-1267	—	915	1993	UF_6
91-1290	—	310 per year	1995-1999	U_3O_8/UF_6
92-1032	—	200 per year	1996-1998	U_3O_8/UF_6
92-1164A*	—	785 per year	1996-2001	UF_6e
TOTAL	**2,485**			
INACTIVE	**400**			
INQUIRIES TO BORROW:				
ACTIVE				
92-1505	500	—	1992	
92-1511	750	—	1992	
TOTAL	**1,250**			
INACTIVE	*None reported*			

* New or revised since last month.

[1] For delivery within one year, measured from the date of this Report. This category excludes material deliverable within one year under other than spot or near-term contracts.

[2] For delivery beyond one year, measured from the date of this Report.

Active Projects reclassified as Inactive since last month: *none*

Active Projects removed since last month: 92-1015, 92-1127, 92-1153, 92-1140, 92-1144

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SUPPLY AND DEMAND

Conversion Supply and Demand

NUEXCO Project Number	Quantity (Thousand Pounds U as UF_6) Within 3 Years [1]	Beyond 3 Years [1]	Delivery Period	Remarks
AVAILABLE FOR SALE:				
ACTIVE				
91-1500	400	—	1992	
91-1501	1,100	—	1992	
92-1507	1,100	—	1992	
92-1190*	660	—	1993	
TOTAL	**3,260**			
INACTIVE	*None reported*			
INQUIRIES TO PURCHASE:				
ACTIVE				
91-1275	620	—	1992-1993	
92-1178*	—	3,300 per year	1992-1995	
TOTAL	**620**			
INACTIVE	*None reported*			

* New or revised since last month.
[1] Measured from the date of this Report.
Active Projects reclassified as Inactive since last month: *none*
Active Projects removed since last month: 92-1154

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MARKET REVIEW

SUPPLY AND DEMAND

SWU Supply and Demand

NUEXCO Project Number	Quantity (Thousand Pounds equivalent U_3O_8) Spot or Near-term [1]	Intermediate or Long-term [2]	Delivery Period	Remarks
AVAILABLE FOR SALE:				
ACTIVE				
91-1509	200	—	1992	
91-1515	200	—	1992	
92-1501B	130	—	1992	UF_6e
92-1124	250	250 per year	1992-1994	
TOTAL	**780**			
INACTIVE	*None reported*			
INQUIRIES TO PURCHASE:				
ACTIVE				
92-1152B	5	—	1993	UF_6e
92-1191*	10	—	1993	
90-1196	—	60 per year	1995 on	
91-1152	—	2,700	1995-2001	
92-1016	—	170 per year	1996-2006	
92-1164B*	—	180 per year	1996-2001	UF_6e
TOTAL	**15**			
INACTIVE	**140**			

* New or revised since last month.

[1] For delivery within one year, measured from the date of this Report. This category excludes material deliverable within one year under other than spot or near-term contracts.

[2] For delivery beyond one year, measured from the date of this Report.

Active Projects reclassified as Inactive since last month: *none*

Active Projects removed since last month: *none*

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MARKET VALUES EXPRESSED IN SELECTED CURRENCIES[1]

Australia to Hungary

	Australia (dollar)	Belgium (franc)	Canada (dollar)	China (renminbi)	CSFR (koruna)	EC (ecu)	Finland (markka)	France (franc)	Germany (mark)	Hungary (forint)
EXCHANGE VALUE										
per pound equivalent U_3O_8 as Concentrates										
This Month (June 30, 1992)	**10.36**	**243.02**	**9.29**	**42.39**	**210.80**	**5.77**	**32.17**	**39.73**	**11.81**	**595.66**
Last Month (May 31, 1992)	10.24	256.28	9.32	42.59	221.73	6.06	33.81	41.79	12.46	610.08
12 Months Ago (June 30, 1991)	11.81	337.31	10.33	48.44	— · —	7.98	38.81	55.55	16.39	— · —
per kg U as Concentrates										
This Month (June 30, 1992)	**26.92**	**631.81**	**24.16**	**110.21**	**548.03**	**14.99**	**83.64**	**103.29**	**30.71**	**1,549**
Last Month (May 31, 1992)	26.61	666.28	24.23	110.71	576.44	15.76	87.89	108.66	32.39	1,586
12 Months Ago (June 30, 1991)	30.70	876.93	26.87	125.93	— · —	20.75	100.90	144.41	42.62	— · —
UF_6 VALUE										
per kg U as UF_6										
This Month (June 30, 1992)	**31.53**	**740.04**	**28.30**	**129.09**	**641.92**	**17.56**	**97.97**	**120.99**	**35.97**	**1,814**
Last Month (May 31, 1992)	31.17	780.42	28.38	129.68	675.20	18.46	102.94	127.27	37.94	1,858
12 Months Ago (June 30, 1991)	35.55	1,016	31.12	145.86	— · —	24.04	116.86	167.25	49.37	— · —
TRANSACTION VALUE										
per pound equivalent U_3O_8 as Concentrates										
This Month (June 30, 1992)	**10.42**	**244.59**	**9.35**	**42.67**	**212.16**	**5.80**	**32.38**	**39.99**	**11.89**	**599.51**
Last Month (May 31, 1992)	10.37	259.59	9.44	43.14	224.59	6.14	34.24	42.33	12.62	617.95
12 Months Ago (June 30,-1991)	12.00	342.90	10.51	49.24	— · —	8.12	39.45	56.47	16.67	— · —
per kg U as Concentrates										
This Month (June 30, 1992)	**27.10**	**635.88**	**24.31**	**110.92**	**551.57**	**15.09**	**84.18**	**103.96**	**30.91**	**1,559**
Last Month (May 31, 1992)	26.95	674.88	24.54	112.14	583.88	15.96	89.02	110.06	32.81	1,607
12 Months Ago (June 30, 1991)	31.20	891.46	27.31	128.02	— · —	21.10	102.57	146.80	43.33	— · —
CONVERSION VALUE										
per pound U as UF_6										
This Month (June 30, 1992)	**2.00**	**47.04**	**1.80**	**8.21**	**40.80**	**1.12**	**6.23**	**7.69**	**2.29**	**115.29**
Last Month (May 31, 1992)	2.11	52.91	1.92	8.79	45.78	1.25	6.98	8.63	2.57	125.95
12 Months Ago (June 30, 1991)	1.96	55.91	1.71	8.03	— · —	1.32	6.43	9.21	2.72	— · —
per kg U as UF_6										
This Month (June 30, 1992)	**4.42**	**103.70**	**3.97**	**18.09**	**89.95**	**2.46**	**13.73**	**16.95**	**5.04**	**254.17**
Last Month (May 31, 1992)	4.66	116.65	4.24	19.38	100.92	2.76	15.39	19.02	5.67	277.68
12 Months Ago (June 30, 1991)	4.31	123.26	3.78	17.70	— · —	2.92	14.18	20.30	5.99	— · —
SWU VALUE										
per SWU at 0.30% ^{235}U Tails Assay										
This Month (June 30, 1992)	**86.85**	**2,038**	**77.94**	**355.55**	**1,768**	**48.36**	**269.84**	**333.23**	**99.07**	**4,996**
Last Month (May 31, 1992)	85.84	2,149	78.17	357.17	1,860	50.83	283.53	350.54	104.48	5,117
12 Months Ago (June 30, 1991)	76.97	2,199	67.37	315.80	— · —	52.04	253.02	362.12	106.88	— · —

[1] Calculated using currency exchange rates for the last business day of the month, as published in *The Wall Street Journal*.

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MARKET REVIEW

MARKET VALUES EXPRESSED IN SELECTED CURRENCIES[1]

Italy to United States	Italy (lira)	Japan (yen)	Netherlands (guilder)	S. Africa (comm. rand)	S. Korea (won)	Spain (peseta)	Sweden (krona)	Switzerland (franc)	Taiwan (dollar)	UK (pound)	USA (dollar)
EXCHANGE VALUE											
per pound equivalent U_3O_8 as Concentrates											
This Month (June 30, 1992)	**8,935**	**974.72**	**13.31**	**21.48**	**6,124**	**745.91**	**42.68**	**10.65**	**188.90**	**4.07**	**7.75**
Last Month (May 31, 1992)	9,381	989.28	14.03	21.94	6,194	776.79	44.88	11.29	190.89	4.24	7.75
12 Months Ago (June 30, 1991)	12,182	1,246	18.47	26.13	6,555	1,028	59.19	14.06	242.81	5.57	9.05
per kg U as Concentrates											
This Month (June 30, 1992)	**23,228**	**2,534**	**34.61**	**55.84**	**15,921**	**1,939**	**110.95**	**27.70**	**491.09**	**10.58**	**20.15**
Last Month (May 31, 1992)	24,390	2,572	36.47	57.03	16,102	2,019	116.67	29.35	496.28	11.01	20.15
12 Months Ago (June 30, 1991)	31,670	3,239	48.02	67.92	17,042	2,672	153.88	36.55	631.25	14.49	23.53
UF_6 VALUE											
per kg U as UF_6											
This Month (June 30, 1992)	**27,208**	**2,968**	**40.54**	**65.41**	**18,649**	**2,271**	**129.96**	**32.44**	**575.22**	**12.40**	**23.60**
Last Month (May 31, 1992)	28,568	3,013	42.72	66.80	18,860	2,365	136.65	34.37	581.30	12.90	23.60
12 Months Ago (June 30, 1991)	36,681	3,751	55.61	78.67	19,738	3,094	178.22	42.33	731.11	16.75	27.25
TRANSACTION VALUE											
per pound equivalent U_3O_8 as Concentrates											
This Month (June 30, 1992)	**8,992**	**981.01**	**13.40**	**21.62**	**6,164**	**750.72**	**42.95**	**10.72**	**190.11**	**4.10**	**7.80**
Last Month (May 31, 1992)	9,502	1,002	14.21	22.22	6,273	786.81	45.45	11.43	193.35	4.29	7.85
12 Months Ago (June 30, 1991)	12,384	1,266	18.78	26.56	6,664	1,045	60.17	14.29	246.83	5.67	9.20
per kg U as Concentrates											
This Month (June 30, 1992)	**23,378**	**2,550**	**34.84**	**56.20**	**16,024**	**1,952**	**111.66**	**27.87**	**494.25**	**10.65**	**20.28**
Last Month (May 31, 1992)	24,704	2,605	36.94	57.76	16,310	2,046	118.17	29.72	502.68	11.16	20.41
12 Months Ago (June 30, 1991)	32,195	3,292	48.81	69.05	17,324	2,716	156.43	37.16	641.71	14.73	23.92
CONVERSION VALUE											
per pound U as UF_6											
This Month (June 30, 1992)	**1,729**	**188.66**	**2.58**	**4.16**	**1,185**	**144.37**	**8.26**	**2.06**	**36.56**	**0.79**	**1.50**
Last Month (May 31, 1992)	1,937	204.24	2.90	4.53	1,279	160.37	9.26	2.33	39.41	0.87	1.60
12 Months Ago (June 30, 1991)	2,019	206.47	3.06	4.33	1,086	170.32	9.81	2.33	40.24	0.92	1.50
per kg U as UF_6											
This Month (June 30, 1992)	**3,812**	**415.91**	**5.68**	**9.17**	**2,613**	**318.28**	**18.21**	**4.55**	**80.60**	**1.74**	**3.31**
Last Month (May 31, 1992)	4,270	450.27	6.39	9.98	2,819	353.55	20.42	5.14	86.88	1.93	3.53
12 Months Ago (June 30, 1991)	4,451	455.19	6.75	9.55	2,395	375.49	21.63	5.14	88.72	2.04	3.31
SWU VALUE											
per SWU at 0.30% ^{235}U Tails Assay											
This Month (June 30, 1992)	**74,937**	**8,175**	**111.66**	**180.16**	**51,363**	**6,256**	**357.93**	**89.35**	**1,584**	**34.15**	**65.00**
Last Month (May 31, 1992)	78,683	8,297	117.67	183.98	51,946	6,515	376.38	94.67	1,601	35.53	65.00
12 Months Ago ((June 30, 1991)	79,419	8,121	120.41	170.32	42,735	6,699	385.87	91.66	1,583	36.33	59.00

[1] Calculated using currency exchange rates for the last business day of the month, as published in *The Wall Street Journal*.

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RECENT DEVELOPMENTS

France

Pechiney Sells Nuclear Assets and Cogema Buys UG

The French government announced on June 9 that Pechiney, the multi-national aluminum and packaging corporation, will sell all of its nuclear-related activities to Cogema and Framatome. The sale still requires employee and shareholder approval and is scheduled for completion in July. Pechiney will receive more than FF2 billion (US$ 400 million) from the asset transfer. The French government encouraged the sale as a means of reducing the number of major French operators in the nuclear industry, enabling the two remaining operators to compete more effectively internationally to the benefit of French industry.

With the sale, Cogema and Framatome will share between them the ownership of much of France's fuel cycle industry. In the front end of the cycle, Cogema will focus on uranium production, hexafluoride conversion, enrichment, and on transportation. Framatome's interests will be in the areas of fuel fabrication and zirconium tube manufacturing. The companies will work closely with each other to manage the businesses more effectively. Some of the companies sold by Pechiney to Cogema and Framatome will be operated as if there were an equal partnership between the two conglomerates, a condition which the sale agreement refers to as "closely associated". The diagram shown in **Figure 1** illustrates some of the important ownership interests of both companies and their relationship to one another.

The sale calls for Cogema to assume Pechiney's uranium mining interests in Canada, Gabon, and Niger, as well as its uranium hexafluoride business at Comurhex. Pechiney previously owned 51 percent of Comurhex, and Cogema, 49 percent. As a result of the sale, Cogema will own 100 percent of Comurhex, one of the largest uranium conversion companies in the world. The Comurhex conversion facilities at Malvesi and Pierrelatte, France, have a nameplate capacity exceeding 14,000 MTU per year. Cogema also will take control of Pechiney's share in the nuclear fuel transportation company, Transnucleaire.

Framatome will take over Pechiney's fuel fabrication and other nuclear metallurgy business. Franco-Belge de Fabrication de Combustible (FBFC), once owned by Pechiney and Cogema, will now be majority owned and operated by Framatome. FBFC has facilities in Pierrelatte and Romans, France, and Dessel, Belgium. Cerca, the Pechiney subsidiary responsible for fuel design and testing, also will become 51-percent owned by Framatome. Zircotube, a leading zirconium tube manufacturer, will be owned by Framatome, as will Pechiney's 15-percent share of the US joint venture, Babcock & Wilcox Fuel Company.

Cezus, a Pechiney subsidiary that produces zirconium and titanium, will be sold in two halves. The first half is included as part of the current asset sale—26 percent to Framatome and 24 percent to Cogema. Pechiney will sell the remaining 50 percent to Framatome and Cogema as of March 1995, at which time Framatome will become the operator.

In another industry consolidation, Cogema finalized its purchase of Urangesellschaft mbH (UG) of Germany, first announced in mid-January. All final approvals were received in early June, as Cogema purchased 70 percent of UG. PreussenElektra AG (PREAG), a wholly owned subsidiary of VEBA, will retain a 15-percent ownership share, and Steag AG, also controlled by VEBA, will own the other 15 percent. Cogema will benefit from UG's ownership interests in mining operations in Australia, Canada, Namibia, Niger, and the USA, as well as its joint venture with Techsnabexport of Russia, Internexco. UG's trading and brokerage activities will complement the business of Interuran, a European intermediary owned 75 percent by Cogema.

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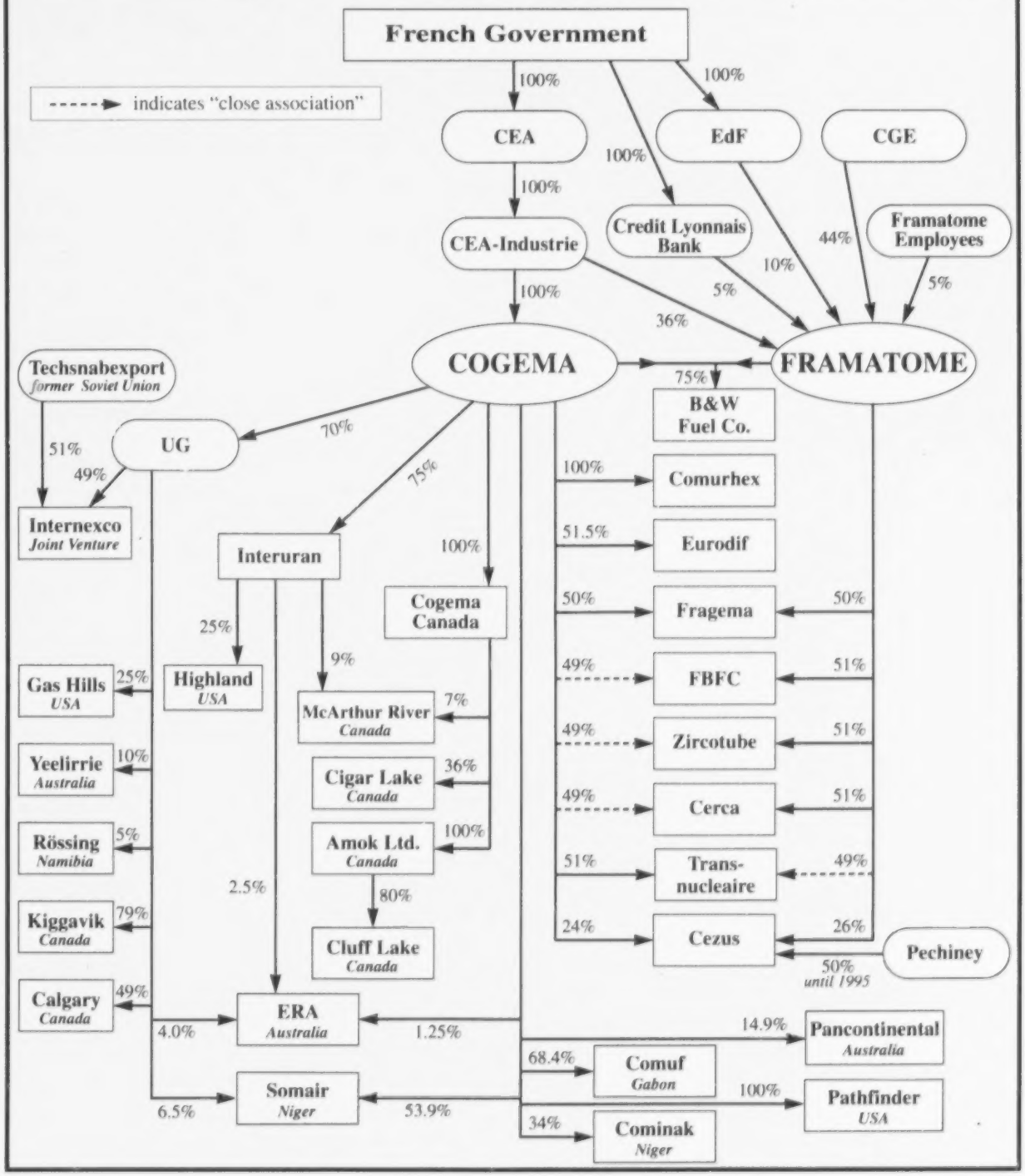
RECENT DEVELOPMENTS

Figure 1
OWNERSHIP INTERESTS OF COGEMA AND FRAMATOME IN THE FRONT END OF THE FUEL CYCLE



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WASHINGTON FOCUS

by Linda L. Gunter

With the Senate Finance committee mark-up of energy tax measures during June, some progress was made toward completion of Congressional consideration of a National Energy Policy bill. However, a major obstacle to a Senate vote is a "hold" placed on the bill by the Senators from Nevada, who object to provisions in the bill that allow the Department of Energy (DOE) to proceed with characterization of the spent fuel repository at Yucca Mountain, Nevada. Once those problems are resolved and the bill comes to the Senate floor for a vote, other Senators may propose amendments that could hurt the bill's chances for final agreement with the House version. On June 17, the House approved the FY 1993 Energy and Water Appropriations bill that allocates money for DOE's nuclear research and development (R&D) programs, enrichment program, and spent fuel repository, as well as the Nuclear Regulatory Commission's (NRC) operating budget. Senate consideration of the Energy & Water Appropriations bill has not yet started, and is not scheduled for any time in the near future.

National Energy Bill

◇ The Senate Finance Committee met June 16 to mark up an amendment to the energy bill (S 2166) containing tax provisions similar to those approved by the House in its energy bill (HR 776). As part of the total amendment considered, Sen. Bill Bradley (D-NJ) had offered an amendment removing the tax depletion allowance currently permitted lead, mercury, uranium, and asbestos companies. His amendment was similar to one already in the House bill, but was defeated on a vote of 12-8. Although there was some speculation the committee might also consider the energy bill's provisions regarding the decommissioning and decontamination of the enrichment plants, there was no discussion of the issue. Progress toward final conference committee consideration of the House and Senate versions of the energy bill has been slow, and analysts estimate the Senate may not vote on the bill until after the July recess.

House Appropriations Bill

◇ On June 17, the House voted 365-51 to approve HR 5373, the bill appropriating funding for DOE and NRC programs for FY 1993. As the first major funding bill passed by the House this year, it confirmed predictions that FY 1993 will be a painful year for many programs, as fighting over a shrinking piece of the pie intensifies. If HR 5373 becomes law, the biggest loser would be the multi-billion dollar Superconducting Super Collider program, whose budget was reduced from its Appropriations Committee level of $483.7 million to zero, unless the program obtains $650 million in commitments from international sources prior to final consideration of the bill this year. The bill also institutes a one-year moratorium on nuclear weapons testing.

The appropriations bill would hold most of DOE's programs at current funding levels, with the environmental cleanup budget the only program to increase in size. DOE's nuclear programs would receive about $304 million, a $31 million reduction from FY 1992 funding levels. Of the $304 million, almost $59 million would be authorized to fund the advanced light water reactor program, and $50 million would be allocated for advanced reactor research and development (R&D), including $12.5 million for R&D on the high temperature gas-cooled reactor. The spent fuel repository program would receive $275 million, a $117 million cut from DOE's budget request. In spite of the fact that the Nuclear

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Waste Fund, which consists of utility contributions to the repository program, has now accumulated over $3.4 billion and will grow by another $600 million during FY 1993, a DOE project manager indicated that, at current Congressional funding levels, the program will not meet its 2001 goal of licensing.

DOE's uranium enrichment program would receive $1.335 billion, based on estimated revenues of $1.462 billion. While the $1.335 billion is an increase from the $1.313 billion appropriation for FY 1992, it is less than DOE's FY 1993 budget request of $1.391 billion. The bill would allocate only $70 million to the AVLIS budget, a reduction of $30 million from DOE's budget request, and $93.6 million from DOE's FY 1992 budget. Further, it would not allow DOE to begin collecting an environmental cleanup fee directly from utilities.

The bill would establish the NRC budget at $535.4 million, an increase of $26.6 million over FY 1992. The bill asks the NRC to expedite the reactor life extension review process and the process for certification of advanced light water reactor designs.

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INDUSTRY BRIEFS

Sequoyah Fuels Restarts UF_6 Operations

Sequoyah Fuels Corporation (SFC), a wholly owned subsidiary of General Atomics, Inc., received authorization from the US Nuclear Regulatory Commission (NRC) on June 12 to restart full conversion plant operations, including fluorination and UF_6 production. Following a routine maintenance outage in September 1991, the NRC, concerned about safety and environmental matters, blocked the restart of SFC's Gore, Oklahoma, facility. During an extended shutdown that continued until April 1992, Sequoyah Fuels addressed the NRC's concerns and met all scheduled deliveries. The facility has a nameplate capacity of 9,100 MTU annually.

◆ ◆ ◆

RTZ to Sell Its Majority Share in Rio Algom

RTZ Corporation of the UK announced on June 8 that it is selling its 51.5-percent interest in Rio Algom, Ltd., the Canadian mining firm. The sale of the 22.5 million common shares is being underwritten by ten Canadian securities firms and has been valued at C$362.3 million. RTZ cited potential conflict of interest concerns as the reason for the sale, as RTZ also owns 100 percent of Kennecott Corporation, another North American company with uranium mining interests.

Entergy and Gulf States to Merge

On June 8, Entergy Corporation of New Orleans, Louisiana, announced a $2.3 billion merger plan in which it will acquire Gulf States Utilities Corporation (GSU) of Beaumont, Texas. The plan calls for a new holding company to be formed to acquire all of the outstanding stock of GSU and Entergy. GSU stockholders will be paid $20 per share in cash or stock. The merger is expected to take 1 to 1½ years to complete and is subject to approval by shareholders, and federal and regulatory authorities, as well as being contingent on non-adverse settlement of litigation currently filed against GSU.

Entergy Corporation's wholly owned subsidiaries include Entergy Operations, Arkansas Power & Light, and Louisiana Power & Light. Entergy Operations has management and operating responsibility for four nuclear plants: Arkansas units 1 and 2, Grand Gulf 1, and Waterford 3. GSU operates and owns 70 percent of the River Bend nuclear station in Louisiana.

Cameco Acquires AGIP Resources

Cameco Corporation of Saskatoon, Canada, announced on June 11 that it had purchased 100 percent of AGIP Resources, Ltd., a subsidiary of AGIP Miniere S.p.A. of Italy, for C$49.75 million. AGIP Resources, which will be renamed Cameco Resources, Ltd., owns a ten-percent interest in the McArthur River uranium project, thereby effectively giving Cameco more than 56 percent ownership share in the project. The purchase further solidifies Cameco's position as a leader in the uranium industry and also fits AGIP's strategy of exiting the uranium and precious metals sector.

◆ ◆ ◆

Taiwan Renews Progress Toward 7th and 8th Units

Taiwan Power Company (Taipower) is once again able to progress toward building the country's seventh and eighth nuclear plants. A June 3 vote by the budget committee of Taiwan's Legislative Yuan to release US$316 million in funds frozen since 1986 was the last major hurdle preventing the renewal of plans to build two new 1,000 MW reactors at Yenliao in northern Taiwan. Taipower already has begun soliciting bids to select an in-house architect/engineer to assist in the process of procuring major equipment. Taipower plans to begin construction within three years, and have the two units operating by the years 2000 and 2001, respectively.

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RECENT DEVELOPMENTS

CFE Considers Purchasing Shoreham Parts

Comisión Federal de Electridad (CFE) officials met recently with officials responsible for the decommissioning of Long Island Power Authority's (LIPA) Shoreham reactor. The meeting explored the possibility of LIPA's selling some reactor parts, such as motors, pumps, and valves, as well as reactor fuel to CFE for use in its Laguna Verde 2 plant. That plant, a 640-MWe boiling water reactor, is approximately three-quarters complete and is similar in design to the never-operated Shoreham unit. The discussions are still in the preliminary stages, and full compatibility of the parts and fuel still must be verified.

LLW Facility Receives City Approval

On June 3, the Martinsville, Illinois, city council approved a resolution that would permit a low-level radioactive waste (LLW) disposal facility to be sited within the city's borders. The successful vote is a major step forward in the efforts by the Central Midwest Compact Commission to site the facility. The facility will be built and operated by Chem-Nuclear Systems, Inc., once all approvals have been received. Chem-Nuclear will pay an annual "community benefit fee" of $2.15 million, adjusted for inflation, to operate the facility during its projected 50-year life. The agreement between the city of Martinsville and the Illinois Department of Nuclear Safety (IDNS) also dictates that only low-level waste produced in Illinois and Kentucky, the two members of the Central Midwest Compact, is permitted in the facility. No high-level waste, spent fuel, transuranic waste, or mill tailings are allowed at the site. The facility also will have a full-time LLW inspector, in addition to the IDNS inspector. The Central-Midwest Compact is one of the few compacts in the USA to make significant progress in siting a new LLW facility.

EdF shuts down St. Laurent A2

On May 27, Electricité de France (EdF) shut down permanently its St. Laurent A2 reactor in central France. The 450-MWe gas-cooled reactor (GCR) had been in commercial operation since 1971. The closure leaves Bugey 1 as the country's sole remaining GCR. The St. Laurent closure is the result of a 1988 decision by EdF directors to phase out all GCRs, and to concentrate exclusively on their standardized pressurized water reactor designs.

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FIRST HALF 1992 MARKET REVIEW

OVERVIEW

Despite uncertainty caused by the anti-dumping petition, market patterns during the first half of 1992 changed little from previous years. Multiple sellers have continued to chase limited demand for actual near-term requirements and fickle discretionary buyers. Activity in 1992 has been brisk, and market volume barely lags the record pace of 1990, surprising most market participants who had anticipated more moderate levels of spot market activity.

Through the end of June, near-term market volume equalled 22.4 million pounds equivalent U_3O_8 in 67 transactions. This rate convincingly outpaces the comparable 1991 activity of 13.5 million pounds in 57 transactions (**Table 1**). Notably, the average transaction size has decreased, indicating that as market prices have dropped below expectations month after month, discretionary buyers have become more cautious, and have tended to purchase smaller quantities to reduce the risk of making large purchases prior to another price decline.

The dominant event in 1992 thus far has been the anti-dumping petition filed against the former Soviet Union. In November 1991, several uranium producers with US operations, and members of the Oil, Chemical and Atomic Workers Union filed a petition with the US Department of Commerce alleging that uranium from the Soviet Union was being sold in the USA at less than fair value. The investigation became more complicated when the Soviet Union dissolved near the end of 1991, and the former Republics, who previously had little or no control over the marketing of their uranium, became independent nations.

Table 1
NEAR-TERM URANIUM SALES
1992 versus 1991–through June

	1992 – Jan.-June		1991 – Jan.-June	
	No. of Sales	Volume [1]	No. of Sales	Volume [1]
Concentrates	42	12.7	37	7.9
Natural UF_6	15	5.1	13	4.3
EUP	10	4.6	7	1.3
Total [2]	**67**	**22.4**	**57**	**13.5**

[1] Million pounds equivalent U_3O_8
[2] Due to independent rounding, columns may not equal total.

Initial market reaction to the filing caused a slight surge in demand that led to an uptick in the NUEXCO Exchange Value to $8.75 per pound U_3O_8 as of December 31, 1991. However, sellers readily continued to supply material, and prices slid below eight dollars per pound within a couple of months, as buyers recognized that supplies remained more than adequate. Thus, when, after several delays, the International Trade Administration of the Department of Commerce issued its preliminary determination on May 29, the primary market reaction was one of indifference. Demand remained moderate, supply ample, and neither buyers nor sellers significantly altered their market plans.

The NUEXCO UF_6 Value followed a pattern similar to that of concentrates, rising to $26.00 per kgU as UF_6 at the end of 1991, before falling once again to less than $24.00 per kgU by mid-year. During the first part of the year, demand for UF_6 was limited compared to that for concentrates, and by May, UF_6 was selling at an $0.18 discount from the sum of the values of its components. Consequently, buyers began to re-examine UF_6 supply options.

On January 31, 1992, the Conversion Value rose $0.05, to $1.60 per pound U as UF_6 reflecting a slight tightening of supply, and remained at that level until June 30, when it decreased to $1.50 per pound U in the face of aggressive selling. Market activity has been notable, with 15 near-term sales reported, totalling almost eight million pounds U of conversion services. The transactions have occurred at prices in a fairly wide range around the prevailing Conversion Value, primarily due to geographic differences.

The Loan Rate has remained unchanged at 3.0 percent per annum since the end of 1991. Activity in the loan market has been somewhat subdued compared to previous years, with only six natural uranium loans reported so far this year, totalling 5.7 million pounds equivalent U_3O_8.

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The SWU Value reached its recent peak of $71 per SWU on January 31, 1992, and since has declined steadily to the June 30, 1992, Value of $65 per SWU. Aggressive selling by a few suppliers pursuing only moderate demand led to the price decline. Seventeen near-term SWU and enriched uranium product (EUP) sales were reported, involving about 1.7 million SWU.

NATURAL URANIUM

Near-Term Market Activity

Spot market prices for uranium concentrates have stayed fairly stable for the past nine months, showing only one anomaly when the Exchange Value rose to $8.75 at the end of December 1991. Otherwise, from October 1991 through June 1992, the Exchange Value has remained between $7.25 and $8.00 per pound U_3O_8.

Near-term market activity has increased in 1992, with 42 concentrates sales reported, totalling 12.7 million pounds equivalent U_3O_8. This exceeds last year's level of 37 transactions for 7.9 million pounds. The relatively high level of activity is somewhat surprising; due to the record quantities purchased in 1990 and the preponderance of discretionary buying in 1991, demand for actual requirements was relatively low, and many market participants expected 1992 market volume to taper off in response. Perhaps because of the consistently low spot prices and because of early perceptions regarding the market impact of the anti-dumping petition, discretionary buying has continued at relatively high levels by both utilities and producers. Moreover, ample supplies have kept prices near record-low levels.

Several factors have contributed to the current market conditions.

Anti-dumping petition against the former Soviet Union—This investigation has been the most scrutinized event in the market throughout 1992. Speculation as to the outcome, the treatment of the former republics, the timing of the decision of the Department of Commerce (DOC), and the influence on the determination by political and government events, have all been widely discussed. Yet despite the complexity of the case, no major surprises have occurred. The affirmative preliminary determination released by the DOC on May 29 was not unexpected, with the preliminary dumping margin of 115.82 percent within the range expected by both defendants and plaintiffs.

The only notable response to the investigation and to the preliminary determination has been the relative non-reaction by the market. Having learned expensive, and sometimes embarrassing lessons in past attempts to anticipate price movements, market participants have watched recent events carefully, and have reacted cautiously.

Abundance of supply—Regardless of potential government-imposed barriers to free trade, the fact remains that there is a vast oversupply of uranium relative to demand. Further, additional new high-grade deposits in Saskatchewan, the liquidation of government stockpiles, and the concerted effort worldwide to dismantle nuclear weapons represents millions of additional pounds of uranium and reinforces market perceptions of abundant supply into the foreseeable future.

Buyer and seller behavior—The other important factor that has affected the market thus far in 1992 has been the market behavior of buyers and sellers: utility purchases have been greater than expected, and although the number producer sales is lower, intermediaries have remained aggressive. Despite the record levels of discretionary purchases the past few years, utilities remained active buyers during the first half of 1992, making approximately one-third of all purchases and consistently exceeding most analysts' expectations of buying activity.

While producer selling in the spot market typically has declined as prices declined, the current low prices have led producer spot sales activity toward record-low levels. In addition, as many producers have scaled back production, a larger share of any remaining production must be allocated to long-term delivery commitments, reducing any excess inventories available for near-term sales. Producers also may have held onto inventories in anticipation of higher prices as a result of the anti-dumping petition, although those higher prices have not materialized.

While the anti-dumping investigation has not disrupted market activity to any great extent, it has introduced a new element of uncertainty in the marketplace. The additional perceived risk is enough to cause some traditional buyers and sellers to become cautious. The result is that traders, the traditional risk-takers, have developed a larger role in the market. Intermediaries of some type have been involved as a buyer or seller in 62 of the 67 uranium transactions so far this year.

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Utility policy of reduced inventories—The decision by many utilities to reduce inventories has noticeably decreased demand for actual near-term requirements. Those utilities remain active in the market, but only on a discretionary basis. Thus, demand has, in aggregate, become increasingly price sensitive, and any tendency toward higher prices can be quickly negated by reductions in demand.

The level of UF_6 market activity has remained consistent with past years, accounting for 20-25 percent of near-term uranium market volume. Early in 1992, as the intense competition in the concentrates market created more attractive prices, most buyers opted to buy uranium in that form. During the second quarter, in the face of relatively larger supplies, competition in the UF_6 market increased. The UF_6 Value steadily decreased from $24.50 per kgU as UF_6 on January 31, to $23.60 per kgU on May 31. At that point, UF_6 was selling at an $0.18 discount from the sum of the values of its components, making UF_6 an attractive option to buyers. Limited demand kept the UF_6 market fairly quiet in June, and the UF_6 Value remained $23.60 per kgU on June 30.

Activity in both the UF_6 and concentrates markets demonstrates an emerging trend of lower average quantities per transaction. In 1990, an average near-term transaction was nearly 340 thousand pounds equivalent U_3O_8; in 1991, the average had fallen to 267 thousand pounds per transaction. Although the average (mean) volume per sale thus far in 1992 is 330 thousand pounds equivalent U_3O_8, this has been skewed upwards by two large sales by producers that totalled more than six million pounds equivalent U_3O_8. When these two near-term sales are removed from the calculation, the 1992 average transaction size falls to 248 thousand pounds.

The current trend toward smaller purchases probably reflects two factors, both related to today's historically low prices. Utilities making discretionary purchases have accounted for the majority of sales, but these buyers have seen prices fall consistently over the years, and are unwilling to risk a major purchase at another perceived market bottom. By making several smaller purchases, they are better able to diversify their risk. Another factor affecting the shrinking average transaction quantity is the growing role of producers as major buyers in the past few years and their current tendency to buy smaller lots more frequently, in order to match their specific delivery requirements under long-term contracts. This strategy permits the producer to minimize its market risk, when buying on the spot market to fulfill delivery commitments for contracts using market-related pricing terms.

Market Volume

Near-term volume through the first half of 1992 totalled 22.4 million pounds equivalent U_3O_8 in 67 transactions. This represents a 66 percent increase over 1991's level of 13.5 million pounds, and is the second-highest level ever for a first-half-year market volume, just behind 1990's record pace (**Figure 1**).

Given this year's high number of discretionary purchases caused by the low prices, this pace is unlikely either to continue or surpass 1990's record level unless the prices remain near their record-low levels. Nevertheless, 1992 could become the second-most active year in the history of the uranium spot market.

Buyers

Utilities have completed the most contracts thus far in 1992, accounting for 30 of the near-term purchases and 9.1 million pounds equivalent U_3O_8. Intermediaries have made 13 purchases totalling almost ten million pounds, and producers, 21 purchases totalling 3.3 million pounds. This represents a notable decline in the market share of producer buying compared to the previous two years. In general, the relative stability of spot market prices has made buyers less anxious and more comfortable waiting until delivery commitments or requirements dictate a purchase.

The 1992 near-term uranium market has been most active in the USA, as 79 percent of the purchase volume can be attributed to US buyers (**Figure 2**). European buyers have accounted for 14 percent. Canadian, Asian, Australian, and other buyers have combined to purchase the remaining seven percent.

Sellers

Sales activity in 1992 has been dominated by traders. Sales by intermediaries accounted for 55 percent of first half 1992 market volume. Producers were the next most active, concluding seven near-term sales totalling 9.2 million

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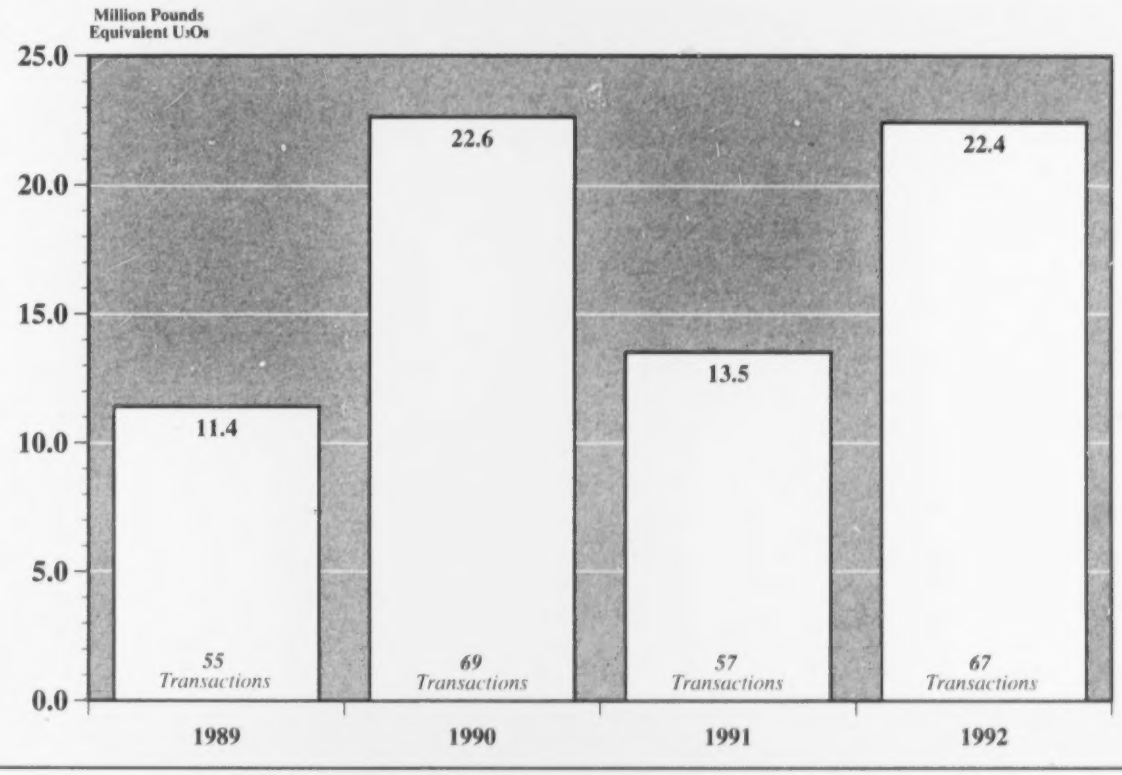
Figure 1
HISTORICAL FIRST HALF-YEAR URANIUM SALES VOLUME – 1989-1992



pounds equivalent U_3O_8 (41 percent), although this total would be nearer three million pounds were it not for the two large producer sales mentioned earlier. Other sellers this year included utilities, converters, fabricators, and unidentified entities. Overall, the number of sellers active in the market is down slightly, primarily because of the inactivity of producers, but the competition among the active sellers has been intense at times. The sellers have had abundant supplies available, and have priced material aggressively to compete for available demand.

US sellers have been the most active (45 percent), followed by European sellers including the CIS (34 percent). Other sellers have included entities from Asia, Canada, and Australia (**Figure 3**).

Long-Term Market Activity

After an active 1991, the pace of long-term uranium contracting has slowed somewhat. Through June, twelve long-term natural uranium transactions had been reported totalling approximately 15 million pounds equivalent U_3O_8, with deliveries ranging from 1992 through 2004. Ten of the sales involved concentrates; the others, UF_6. Utilities made 11 purchases and an intermediary, the other; sellers were almost equally split between producers and intermediaries. Market-related pricing terms were used in seven of the contracts. Base-escalated, fixed-price schedules, or complex price formulas combining different types of pricing mechanisms, were used in the other five sales.

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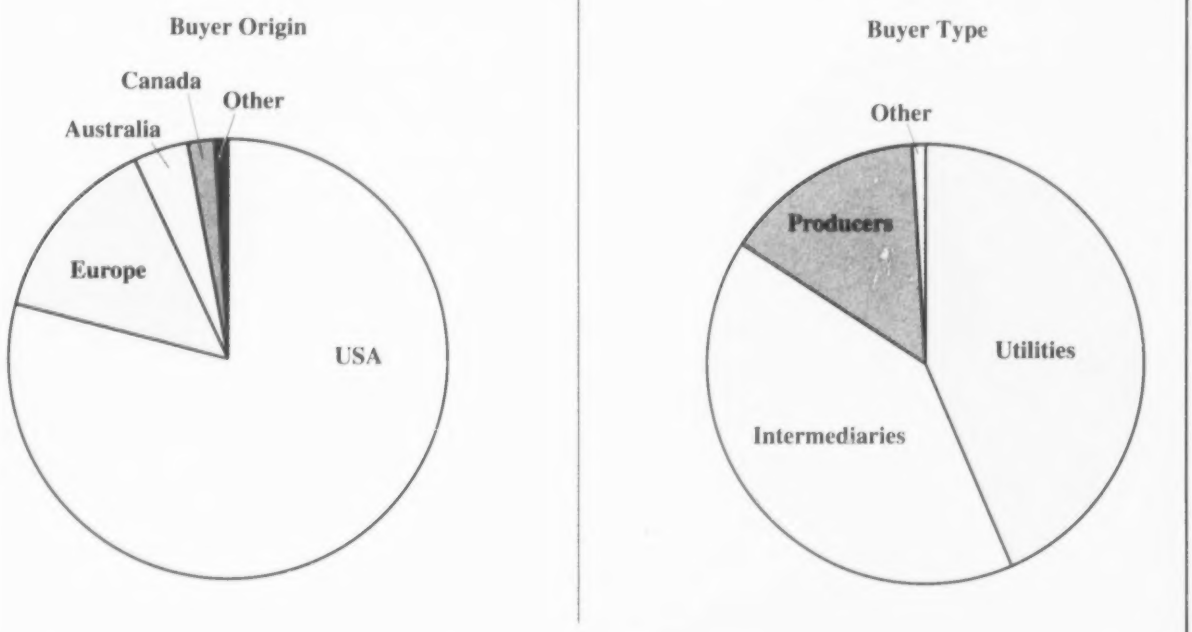
Figure 2
1992 NEAR-TERM URANIUM BUYERS
BY ORIGIN AND TYPE
(percent share by volume)



Interest in long-term contracting remains high, particularly in the USA, with many utilities attracted by historically low, relatively-stable prices, combined with other favorable commercial terms, including quantity flexibility, low ceiling prices, and an absence of floor pricing. Market-related pricing terms are still favored, but many utilities have begun to diversify their portfolios. Several utilities also have begun to lengthen their delivery windows. Some recent contracts have called for initial deliveries beginning in the mid- to late-1990s, with some final deliveries extending past the year 2000. This is a significant change compared to previous years, when spot market prices were falling continuously and utilities typically contracted nearer term and for shorter periods to protect themselves in the case of future price declines.

URANIUM LOANS

The Loan Rate has remained at 3.0 percent per annum since December 31, 1991. Overall, the loan market has been fairly quiet: only six natural uranium loans were reported in the first half of 1992, totalling approximately 5.7 million pounds equivalent U_3O_8. One large loan to an intermediary accounts for more than half of this year's loan volume. Intermediaries were the borrowers in all six 1992 loans, obtaining material from both utilities and producers. Comparatively, at this time in 1991, loan volume equalled 5.2 million pounds through eight loans.

Loan supply remained abundant, having ranged from 1.4 million to 10.6 million pounds equivalent U_3O_8 so far this year, and averaging more than 6.3 million pounds each month. However, loan demand has remained very low,

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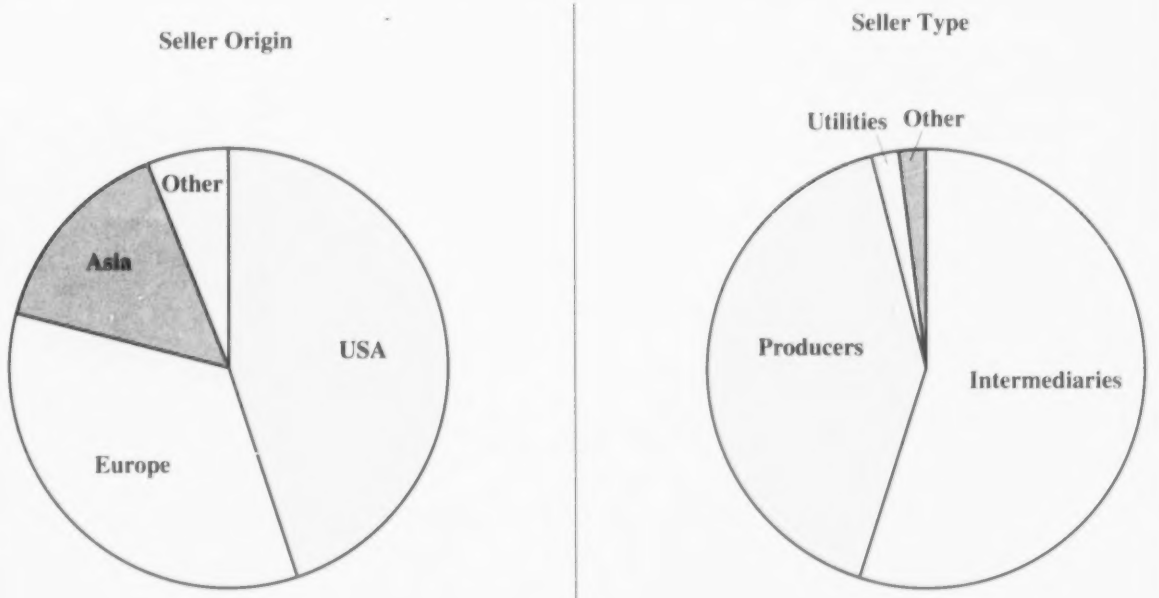
Figure 3
1992 NEAR-TERM URANIUM SELLERS
BY ORIGIN AND TYPE
(percent share by volume)



sometimes falling to zero. The low level of loan activity this year is a direct result of the low demand. The reduced level of demand is, itself, a reflection of the current price stability. Loans are most attractive when prices are falling—less attractive when prices are stable, rising, or expected to rise.

CONVERSION SERVICES

The NUEXCO Conversion Value rose $0.05 from its level of December 31, 1991, to $1.60 per pound U as UF_6 as of January 31, 1992, and remained at that level until June 30. It then decreased $0.10, to $1.50 per pound U as aggressive pricing by sellers put downward pressure on the conversion market, particularly in the USA. The conversion market has been quite active this year, particularly in the near-term market. Fifteen near-term conversion sales have been reported so far in 1992, totalling nearly eight million pounds U of conversion services. This compares to only six sales last year at this time and already exceeds the entire 1991 total of nine sales for less than two million pounds U.

Prices on near-term transactions varied considerably from the prevailing Conversion Value. While some transactions were concluded each month near the Conversion Value, others occurred both above and below this level. In general, prices tended to be higher in Europe and lower in the USA. Factors that contributed to the higher European conversion prices were higher levels of demand and the fact that the most active sellers were primary converters with little excess capacity and little incentive to offer aggressive

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pricing terms. In contrast, prices were lower in the USA, where primary converters had excess capacity and where several traders were active sellers.

In the long-term conversion market, activity thus far in 1992 has not kept up with 1991's record level—15 sales totalling 33 million pounds U during the year. Only two intermediate- and long-term sales have been reported so far this year, totalling approximately 3.5 million pounds U. Nevertheless, several utilities have been active in the market, as long-term conversion contracts have expired, and the excess UF_6 supplies overhanging the market in 1990 and early 1991 have largely dissipated.

ENRICHMENT SERVICES AND ENRICHED URANIUM PRODUCT

The SWU Value ended 1991 at $70 per SWU, rose to $71 per SWU on January 31, 1992, and has steadily declined to its current level of $65 per SWU. Despite some mismatches in timing between supply and demand that constricted supply and led to the late-1991 price increase, secondary SWU supply remains ample to meet demand. Aggressive competition among sellers is reflected by the recent price decline.

The near-term enrichment market has been fairly steady, as 17 SWU and EUP sales were reported through June, totalling approximately 1.7 million SWU. This is roughly equal to 1991's level of 18 sales of 1.5 million SWU during the same period. Seven of the 1992 transactions were for SWU only, while the remaining ten sales involved almost one million SWU and 4.6 million pounds equivalent U_3O_8 of feed contained in EUP. Utilities were the buyers in 12 of the sales, with intermediaries and fabricators comprising the balance. Intermediaries were the predominant secondary market sellers, providing material in eleven near-term sales. Primary enrichers, utilities, and unidentified entities sold the remainder.

The long-term enrichment market has had virtually no activity so far this year. Only one long-term SWU contract is known to have been concluded through June 1992. A European utility purchased a large quantity of SWU for delivery during the period 1993 through 1997. The major factor leading to this dearth of activity was the enormous level of long-term enrichment contracting that was concluded in 1991. That year witnessed the highest level of long-term contracting since the introduction of DOE's Utility Services Contract (USC) in the mid-1980s; 25 long-term enrichment transactions involving almost 9.5 million SWU were concluded, primarily during the second and third quarters.

In contrast, no major suppliers have aggressively entered the market this year, and few utilities have expressed interest in new long-term enrichment contracts. However, the large number of USC contract terminations in 1992 (37 utilities terminated 100 percent of their commitments for FY 2002) and in 1991 (30 utilities terminated 100 percent for FY2000 and 31 utilities terminated 100 percent for FY 2001), have resulted in many utilities, particularly in the USA, with uncommitted enrichment requirements near the turn of the century, foreshadowing another surge in contracting activity.

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NUEXCO

BASIC CONSIDERATIONS

TRANSPORTING URANIUM FUELS;
REGULATION, LICENSING, AND DOCUMENTATION

This is part two of an article focusing on the transport of uranium fuels. Part one was published in the June 1992 Monthly Report no. 286 and dealt with the logistical aspects of this industry. This second part focuses on the licensing and documentation elements of uranium transport, primarily in the USA.

INTRODUCTION

The effort required to transport uranium between each stage of the fuel cycle, from the mills, to the converters, enrichers, and fabricators, is often unrecognized by many participants in the nuclear fuel industry. Yet to those directly involved in transport, it can be a labyrinth of logistics, regulations, procedures, and authorization.

The previous *Monthly Report* article reviewed the many considerations involving the different modes of transportation, samples and their shipping requirements, approved containers and protective packaging, shipment scheduling, and coordination of transportation services. The documentation requirements and regulations covering the movement of nuclear fuel and equipment is another major facet of the transportation system. The topic of US regulation of the uranium fuel transport industry is, in itself, quite extensive and involved. Therefore, this article addresses only the most common regulatory and documentation issues; the smaller details, special situations, and issues of insurance, are left for the professional transport manager to investigate.

LICENSES

For security reasons, no person may export or import nuclear equipment or material to or from the USA without a license issued by the US Nuclear Regulatory Commission (NRC). The Commission may grant an exemption to the licensing requirements if it determines that the exemption is authorized by law; does not endanger the country's security; and does not constitute an unreasonable risk to the public health and safety. NRC will only grant such an exemption after coordination with the Executive Branch of the US government. The exemption does not relieve any person from complying with the regulations of other government agencies having additional jurisdiction over exports or imports.

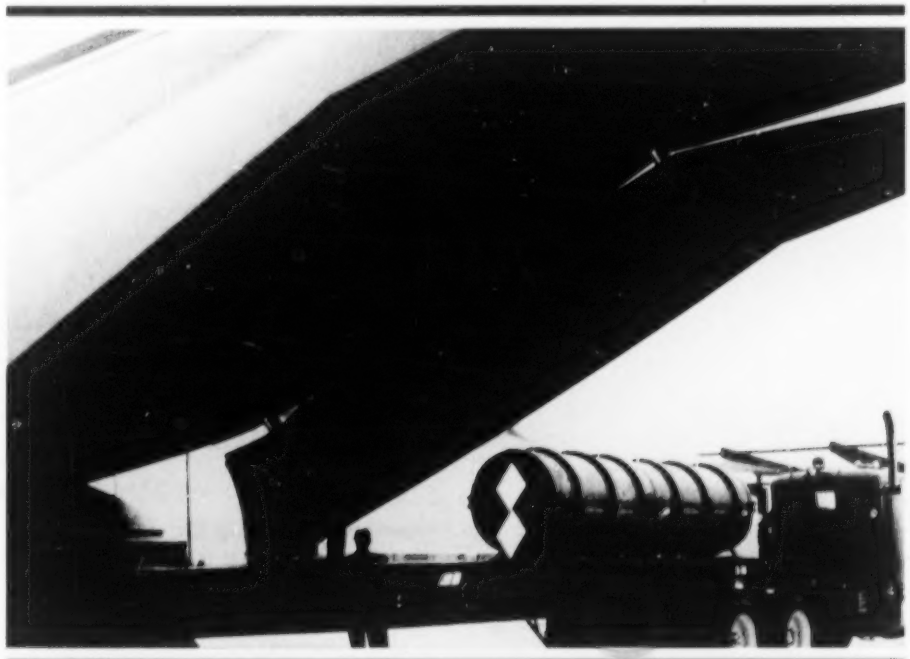

Figure 1 — Unloading Air Shipment. UF_6 30B cylinders in their protective shipping packages being unloaded from a cargo aircraft to a flatbed truck trailer.

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Materials Requiring Transport Licensing

Export items requiring a license are:

- Special nuclear material.
- Source material.
- Byproduct material.
- Deuterium.
- Nuclear-grade graphite.
- Nuclear reactors and their components or parts.
- Plants for the separation of the isotopes of source material, special nuclear material or lithium, and components of these plants.
- Plants for the reprocessing of irradiated nuclear reactor fuel elements and components for these plants.
- Plants for the fabrication of nuclear reactor fuel elements and specially designed or prepared parts and components for these plants.
- Plants for the production of heavy water, deuterium and deuterium compounds, and specially designed or prepared parts and components for these plants.

Import items subject to licensing are:

- Production and utilization facilities.
- Special nuclear material.
- Source material.
- Byproduct material.

Types of Licenses

The primary transport license NRC issues is called a **specific license**. The specific license authorizes a named person to export or import only a particular material to a designated destination/entity. The license has both time and quantity limitations. NRC's approval of this license is confirmed by the agency's issuance of a license certificate to the applicant.

Another form of license commonly used by NRC is the **general license** and is conferred by NRC regulation (that is, no certificate is issued). In nearly all situations, the regulatory authorization that confers the general license to transport is conditional upon the existence and terms of a specific license for that shipment, and generally licenses any person to perform transport services for the holder of the specific license. Performing under a general license, a person may import or export byproduct, source, or special nuclear material (except for irradiated fuel exceeding 100 kg per shipment) authorized by the specific license.

License Applications and Renewals

Applications for specific licenses are sent to the Assistant Director of International Security, Office of Governmental and Public Affairs, US Nuclear Regulatory Commission. To apply for a **license to export nuclear material and equipment**, an applicant must file Form NRC 7. To apply for a specific import license, the applicant must send a letter containing the required information. Import and export license requirements are outlined by the US Nuclear Regulatory Commission in the *Code of Federal Regulations* (*CFR*) under Title 10, Part 110 Import and Export of Nuclear Equipment and Material.

Before NRC will issue a specific license, it must be assured that the receiving/shipping country has knowledge of the shipment and agrees that the material being shipped will be used in accordance with bilateral safeguards agreements between that country and the USA. Since the bilateral agreements are administered by the Department of Energy (DOE), NRC sends a copy of a license application from a US entity to DOE, with a request that DOE obtain written authorization for the shipments from the foreign country. Depending upon US agreements with that country, DOE may contact the country directly to obtain the authorization, or may request the State Department to make the contact. When DOE obtains the authorization, it advises NRC that it approves the shipment. In general, this is the only governmental assurance required by NRC to issue a license. In special cases, such as unusually complex transactions or the movement of highly enriched uranium ($\geq$ 20 $^{w}/_{o}$ ^{235}U), the licensing staff of NRC may forward the application to the NRC commissioners for review.

When each import or export is completed, a record of the quantity and form of the material must be noted on the back of the original license. When the total quantity allowed by the specific license has been met, the license must be returned to NRC, indicating that the quantity limitation has been reached.

A license may be amended if a request is made to, and approved by, NRC. The license also may be renewed if it has not expired. If the renewal request is submitted thirty days or more before the license's time expiration, the time limit is suspended until NRC acts upon the renewal request.

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Retransfers

If material exported from the USA needs to be re-shipped from the receiving country to a third country and the third country is not on the original export license, this shipment is known as a retransfer or subsequent arrangement. The Nuclear Non-Proliferation Act of 1978 (NNPA) introduced the concept of the subsequent arrangement, although retransfers performed prior to the NNPA's enactment had always been handled in the manner prescribed by the NNPA. Before material exported under an NRC license can leave a country approved in the original export license, DOE must approve the transfer and be assured that the material will be moved to third country with which the USA has a bilateral safeguards agreement. For such a retransfer, an **approval for retransfer of special nuclear material of United States origin** (DOE Form MB#10) must be submitted to DOE by the US party to the original shipment. DOE proceeds much as it does in the original license application, by writing a letter to the embassy of the third country (the country that is the destination in the proposed retransfer), asking that country to confirm, in writing, that the material it is to receive will be subject to the terms and conditions of the bilateral agreement for nuclear cooperation, and that the party in the country that is to receive the material is authorized to do so.

Canadian Approval For Passage

The Canadian government requires anyone importing radioactive materials into Canada to obtain an **import license** from the Canadian Atomic Energy Control Board. Even if radioactive materials are planned only for shipment on a route which crosses the country's territorial boundaries, Canada requires that the Port Authority be notified at least 48 hours in advance, with such notification conferring a *de facto* **transit permit**.

US CUSTOMS SERVICE

All goods entering the USA must be examined by the US Customs Service, a division of the Department of Treasury. By law, Customs is allowed to open and examine all goods entering the USA, and in the case of radioactive materials, may require a sample of the material to be analyzed prior to release, to verify statements made on the entry paperwork. However, Customs normally examines only the paperwork and sometimes the external packages. If the agency has any questions about an entry of radioactive materials, it usually contacts NRC.

Since only a licensed customs house broker is permitted to perform transactions with the US Customs Service, a customs house broker must be hired at each port of entry and given power of attorney to act on the client's behalf. US Customs requires that a copy of the specific import/export license be on hand for examination, so lodging a copy of the license with the customs house broker hired for that port of entry is recommended. The customs house broker also uses the license number for the customs import/export documentation that he must complete.

Under Customs regulations, all goods coming into the USA must have forms and associated documentation to obtain a *formal entry* into the USA. A **consumption entry** is a type of formal entry under which goods can enter into the USA, and remain for use in the country. This form of entry also is used for imports when the transport agent has no knowledge of, or responsibility for, potential future export of the goods. If the goods are later exported, a claim may be made to Customs to recover the duties or fees paid at the time of entry. Goods imported for processing and then exported may be brought in on a **temporary import entry**, and thus avoid the customs user fee.

FEES

The Omnibus Reconciliation Act of 1986 created a new *ad valorem* user fee, called the **customs user fee**, to be paid by the importer of record to cover the processing expenses of each entry of merchandise for US consumption. The original user fee, valid until September 30, 1987,

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was 0.22 percent of the value of the merchandise. The Secretary of the Treasury has since determined, as he is authorized to do, that a new rate of 0.17 percent is appropriate. Also, due to conflicts between the *ad valorem* character of the fee and the international regulations of the General Agreement of Tariffs and Trade, the customs user fee is now capped at a maximum of $400.

Fee regulations exclude from payment of the customs user fee those articles classified in Schedule 8 of the Tariff Schedules, including US origin goods returning to the country and products imported from developing countries. It also exempts goods brought into the country under a temporary import bond or an instrument of international trade bond. (See Bonds section for definition.)

The Harbor Maintenance Revenue Act of 1986 imposed a **harbor maintenance fee** on any port use. The tax is 0.125 percent of the value of the imported commercial cargo and is used used to help fund harbor maintenance and services. The US Customs Service administers the fee in a manner similar to customs duties on imports. Thus, the harbor maintenance fee is only applicable to entries for US consumption and not to cargos entered under a temporary import bond or an instrument of international trade bond.

BONDS

Since at the time of entry, all fees and applicable duties are due to the US Customs Service, a bond is posted for all goods requesting entry into the USA. This bond is a guarantee that all required duties and fees will be paid, and that the entry is in accordance with all laws and regulations of the USA.

Nuclear materials are "unequivocally duty free" until they are assembled into a completed fuel rod with the end caps attached. Since Customs generally accepts that nuclear material is duty free, it has allowed a minimum bond to be posted against the material's high value. Normally a bond of $100,000 for material, and $10,000 for shipping packages is acceptable at all ports of entry. A bond can be posted for a client by the customs house broker, or the client may post his own bond. However, it is most cost-effective to purchase a bond from a customs house broker, due to the broker's relatively small administrative fees.

To meet the variety of imports, several types of bonds are available.

A **general term bond** allows multiple entries into all US ports for one year. The general term bond may be purchased from a customs broker, at an approximate fee of $200 per year.

A **single entry bond** is used for a single entry of goods for consumption in the USA. This bond also may be purchased from a customs broker, at an approximate fee of $20-$50 per entry.

A **temporary import bond** allows material to remain in the country for one year prior to re-export, but extensions may be requested for up to five years. The fee charged by the broker for this bond is usually in the same range as the single entry bond: $20-$50 per import.

An **instrument of international trade bond** (IITB) is used for packages and containers that carry materials in international commerce. This includes cylinders, overpacks, or other containers and casks used for radioactive cargos. The IITB assures that the shipping packages are only entering the USA to carry goods to their destination and will not be used in US commerce. The IITB insures that a duty will be paid on the value of the packages should they be used in US commerce. The broker's fee is approximately $200 per year for the IITB.

DOCUMENTATION

Invoices

Invoices should be addressed to the named importer on the import license. But, often the receiving facility is named on the invoice, and, when the recipient does not match the import licensee, it can cause problems with customs inspections. This discrepancy can be remedied by showing both the importer and receiving facility on the invoice, and delineating the function of each.

Invoices for customs officials should be marked "For Customs Purposes Only", as they need not be commercial invoices. The Customs invoice for the shipping container should indicate the container's depreciated value. The invoice for the nuclear material should show the quantity and value of the material, as well as a unit cost to explain that value. If the material is being imported against an international import certificate (see Certification and Declaration section), the value on the invoice should be the same as that shown on the international import certificate.

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Because shipping packages are evaluated by Customs separately from the material, it is important to assure that separate *pro forma* customs invoices are issued and received for the packages and the material. Thus, the packages can be assigned a different bond from the material contained in the packages. However, such separate invoices are not necessary for uranium ore concentrate and its drums. Since Customs considers the drums to be disposable packaging, which will neither be consumed in the USA nor reused, the drums are not charged any import fees.

Bills of Lading

For an international export shipment, a **domestic inland bill of lading** is completed for the cargo's transit to the port. An **ocean bill of lading** is issued by the steamship carrier for the ocean voyage. In all cases, the basic description of the cargo and specifics as to the radioactive nature of the cargo must be included on each bill of lading.

Certificates and Declarations

The receiving/shipping facility in the USA must be advised of the appropriate specific import or export license number so that the facility can complete a **nuclear material transaction report** (NRC Form 741).

Each export must be accompanied by two copies of a **shipper's export declaration** (DOC Form 7525-V) that contains extensive shipment information. This form must be signed by the exporter or his agent and is required to be filed with Customs with the shipping manifest. It is a document under the control of the International Trade Administration (ITA), a department of the Bureau of the Census under the Department of Commerce (DOC). Because the document provides so much information, it is used for a myriad of purposes, from checking the legality of the shipment, to checking the US balance of trade for the month. A shipper's export declaration is not necessarily needed for empty shipping packages, but it is the document most often used as proof of export for other contractual and bonding purposes.

An **international import certificate** (DOC Form BXA-645P) is issued by the receiving country to verify that the country has knowledge of the pending shipment and that it has indicated the acceptability of the shipment to its government. The issuance of an international import certificate is not required by the USA for import into this country, but a French export license requires that the USA issue an international import certificate.

When it is necessary for the exporter to receive an international import certificate, the completed certificate application is sent to the Export Administration of the Department of Commerce. If the agency approves the application, it assigns and logs a certificate number, and then returns the approved certificate to the exporter.

A **delivery verification certificate** is presented to Customs at the time of import, so that the department will note on the certificate the entry information and provide the authorizing signature. The information on the delivery verification certificate (ITA Form 647P) should match the information on the international import certificate. Then the delivery verification certificate is forwarded to the customs house broker, who notes the exact quantity, the entry number, and the date, and returns it to Customs. The completed form is then sent to the appropriate exporting party for completion of documentation against the export license.

In the event that material is to be exported for foreign processing and then subsequently to re-enter the USA (for US consumption), it is useful to complete a **certificate of registration** (Customs Form 4455) and a **certificate of manufacture**. These documents can be used to prove the US origin of the returned goods and the fact that they were exported solely for processing. The re-imported goods are exempt from the customs user fee; however, this fee *is* applied to the added value of the foreign processing. When paying the customs user fee only on the value of the foreign processing, a **declaration for free entry of returned American products** (Customs Form 3311) is required.

When a Customs application is submitted for entry of foreign material to be processed in the USA and then re-exported, Customs may require the importer to supply a certificate of manufacture to avoid paying the customs user fee. In this case, the certificate of manufacture is completed by the US firm performing the processing of material, to confirm the material is only for foreign use.

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Air Shipment

An **air waybill** is issued by the air carrier, in accordance with the information in the shipper's letter of instruction for dispatch of goods or the shipper's declaration for dangerous goods. The air waybill must be completed and signed by the shipper, thus relieving the air carrier of the responsibility for goods improperly described on the carrier's manifest.

A copy of the US Department of Transportation's **certificate of competent authority** is required for air shipments of nuclear materials. It certifies that the shipping package design meets the regulatory requirements for Type B packaging for fissile radioactive materials as prescribed by the IAEA and by US regulations.

In addition to the normal requirements for markings and labels, a label for the cargo aircraft may also be required. Regulations covering the conditions for such a label are found in the International Civil Aviation document *Technical Instructions for the Safe Transport of Dangerous Goods by Air*.

Figure 2 — DOT Required Markings. On the grill of this truck are two labels DOT requires for UF_6 transport.

HAZARDOUS MATERIALS REGULATIONS

The Department of Transportation (DOT) has issued regulations for the transport of hazardous materials, which include radioactive materials. Each type of material has an assigned proper shipping name and identification (ID) number (found in 49 *CFR* Part 172.101, subpart B). The most common ID numbers and proper shipping names used for the transport of commercial nuclear fuel are:

ID Number	Proper Shipping Name
• UN 2908	Radioactive material, empty packages
• UN 2910	Radioactive material, limited quantity, n.o.s.
• UN 2912	Radioactive material, LSA, n.o.s.
• UN 2918	Radioactive material, fissile, n.o.s.
• UN 2977	Uranium hexafluoride, fissile (> 1.0 % ^{235}U)
• UN 2978	Uranium hexafluoride, LSA

n.o.s. = no other specification (is more specific)
LSA = low specific activity

DOT regulations (49 *CFR* Part 172.200-204, Part C) require extensive information to appear in a specific order on shipping papers when hazardous materials are transported. Among the items that must be listed are: proper shipping name; identification number; name of the radionuclide (listed in 49 *CFR* Part 173.435); the physical and chemical form of the material; the curies of emitted radiation per package; the fissile class; total quantity of material by weight or volume; and the number and type of shipping packages. For enriched UF_6, the certificate of compliance for radioactive materials packages identification number (NRC Form 618, item 1c) must be included.

Shipping package markings are usually the responsibility of the package manufacturer or the originating facility of the shipment. However, the marking function can be assigned to a transport agent or carrier, and therefore knowledge of the marking requirements (49 *CFR* Part 172, subpart D) is important. A knowledge of labeling requirements (49 *CFR* Part 172, subpart E), and placarding requirements (49 *CFR* Part 172.500, subpart F) also is important. Markings/labels/placards on the shipping packages must match those on the shipping papers.

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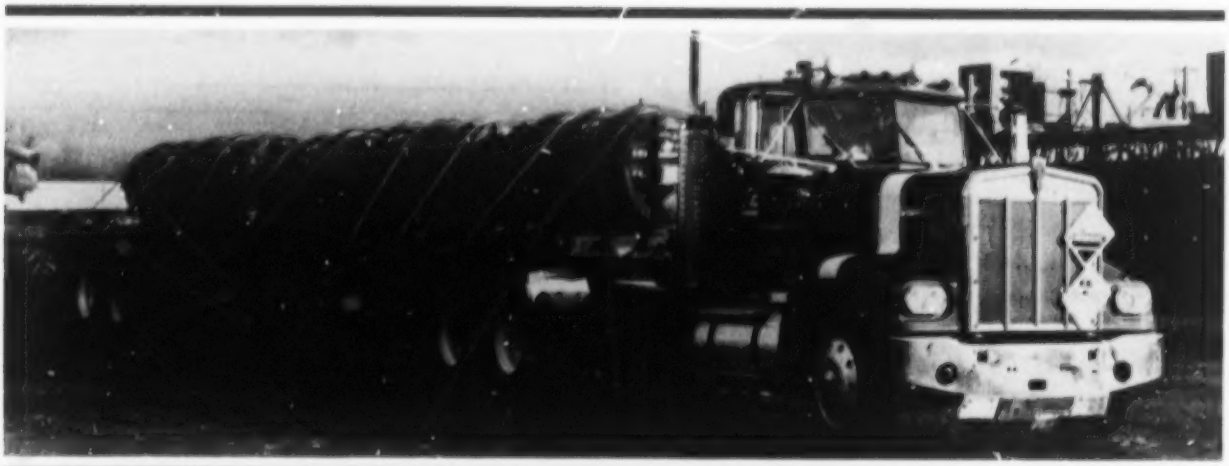

Figure 3 — Ready For Road Transport. Truck and trailer, with all DOT required labels, ready to move five UF_6 containers.

The basics of the marking requirements are:

- The shipping package must have the gross weight, shipping package type, and certificate number legibly marked in 0.5-inch letters/numbers.
- The identification number must be displayed on an orange panel (6.25 inches high and 15.75 inches wide with a 0.56-inch black border).
- The identification number must *not* be displayed on a radioactive placard.

The basics of the labeling requirements are:

- A label on each individual shipping package is not required for low specific activity material when the material is being transported in a conveyance exclusively assigned for the use of the consignor.
- Each shipping package that requires a label for a hazard must have two of the proper labels, one of each attached to opposite sides of the shipping package.
- The proper label (49 *CFR* Part 172.403) is determined by the radiation level at the surface of the shipping package; the transport index; and (if appropriate) the fissile characteristics of the shipping package.
- If the material qualifies as having more than one hazard, the shipping package must be labelled for all hazards. An example is UF_6 which is both a radioactive hazard and a corrosive hazard, and in Europe is also classed as a poison because of the fluorine content.

Since DOT regulations for transport are quite extensive, no attempt has been made to give a complete explanation in this article. Some of the more important of these regulations are as follows:

- Part 173 – Shipper's General Requirement for Shipments and Packaging. This part of the regulations includes specifications for material that is highway-route controlled, packaging requirements for radioactive materials, and requirements for exporting DOT specification Type B and fissile shipping packages.
- Part 174 – Carriage by Rail
- Part 175 – Carriage by Aircraft
- Part 176 – Carriage by Vessel
- Part 177 – Carriage over Public Highways
- Part 178 – Shipping Container Specifications. This part prescribes the manufacturing and testing for shipping packages and containers for hazardous materials.
- Part 397 – Driving and Parking Rules.

CONCLUSION

As with most government regulations, the entire array of relevant laws would fill the average library and probably is of interest only to the dedicated transport professional. This two-part article was intended to aid and familiarize those who depend on the transportation of nuclear fuels in their business dealings, yet rarely deal directly with transportation's complexities, the depth of regulations, logistics, packaging requirements, and transport modes involved.

Jeffrey D. Price
Alan L. Wolcott

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DEFINITIONS RELEVANT TO TRANSPORT REGULATIONS

Special Nuclear Materials – Under the *CFR* definitions, special nuclear materials include plutonium, uranium-233, or uranium enriched above 0.711 percent in the isotope uranium-235.

Source Materials – Source material, as defined in the *CFR*, is uranium (such as U_3O_8, and UF_6 at natural enrichment levels), thorium, or ores that contain, by weight, 0.05 percent or more of uranium or thorium, or any combination.

Person – Under the *CFR* definitions, is defined as any individual, corporation, partnership, firm, association, trust, estate, institution, or government agency, except the NRC (other government agencies may be exceptions under certain conditions).

Packaging – The *CFR* defines packaging as one or more receptacles and wrappers and their contents, excluding special nuclear materials, source material, or byproduct material, but including absorbent material, spacing structures, thermal insulation, radiation shielding, devices for cooling, devices for absorbing mechanical shock, external fittings, neutron absorbers, and other supplementary equipment.

A_1 and A_2 – These are points of reference for radionuclide quantity limitations.

The A_1 value is the number of curies for a particular radionuclide when the material, if released, might present a radiation hazard, but not a contamination hazard. These materials are usually encapsulated, such as cobalt.

The A_2 value is the number of curies for a particular radionuclide when the material is U_3O_8, UF_6, or enriched UF_6. The A_2 value is established according to the hazard that would result if an individual ingested or absorbed that radionuclide through his skin.

Transport Index – This is the highest dose rate at one meter distance from the external surface of the shipping package. The transport index can be assigned according to the radiation reading or may be determined by the assigned transport index on the shipping package certificate. Regulations prescribe that the maximum dose rate for transport shall not exceed 200 millirem per hour at any point on the surface of the shipping package, and that the transport index per package may not exceed 10.

Exclusive Use – An exclusive use shipment precludes any other cargo being shipped with the radioactive material. Often there is a surcharge for an exclusive use designation of a shipment, because, theoretically, a carrier is able to fill his vehicle to the maximum load limit, and exclusive use may leave unused capacity in the carrier's equipment.

Type A Shipping Packages – This designates a shipping package type which, during normal conditions of transport, will prevent the loss or dispersal of its contents and will maintain radiation shielding.

Type B Shipping Packages – This designates a shipping package type which will meet all Type A criteria, both during normal and accident conditions of transport.

Fissile Shipping Packages – This designates a shipping package type which must prevent nuclear criticality (unplanned nuclear chain reaction) under both normal and hypothetical accident test conditions.

Fissile shipping packages are, in turn, classified into one of three groups, according to the degree of control which must be exercised to assure nuclear criticality safety.

- **Fissile Class I** – Any number of packages may be transported together.
- **Fissile Class II** – The maximum transport index for all packages must not exceed 50, and no single package may have a transport index that exceeds 10.
- **Fissile Class III** – These packages must be controlled by specific arrangements between the shipper and the carrier. (Refer to Title 49 *CFR*, Part 173.457[*b*].)

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BASIC CONSIDERATIONS

SOURCES OF REGULATIONS

United States

US Department of Transportation
— Title 49, *Code of Federal Regulations*, Parts 100-199

US Nuclear Regulatory Commission
— Title 10, *Code of Federal Regulations*, Parts 71-110

US Postal Service
— Title 39, *Code of Federal Regulations*, Parts 124

US State and Local Transportation Regulations & Legislations
— this is a database compiled and updated quarterly by the Department of Energy, Chicago Operations.

International

International Atomic Energy Agency (IAEA)
— *Regulations for the Safe Transportation of Radioactive Materials – Safety Series 6*
Available from UNIPUB, 1180 Avenue of the Americas, New York, New York 10038 USA

International Civil Aviation Organization (ICAO)
— *Technical Instructions for the Safe Transport of Dangerous Goods by Air*
Available from INTEREG, PO Box 60105, Chicago, Illinois 60660 USA

International Air Transport Association (IATA)
— *Restricted Articles Regulations*
Available from IATA, 200 Peel Street, Montreal, Quebec, Canada H3A 2R4

International Maritime Organization (IMO)
— *International Maritime Dangerous Goods Code (IDMG)*
Based in London, England, and available from numerous steamship lines.

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NUCLEAR INDUSTRY CALENDAR

1992

Sept. 9-11 ***Uranium Institute 17th Annual Symposium*** (London, United Kingdom).
Contact: 44-71-225-0303; Fax: 44-71-225-0308.

Sept. 20-23 ***International Uranium Seminar '92*** (Hyatt Regency Hotel, Lake Tahoe, Nevada).
Sponsored by the U.S. Council for Energy Awareness.
Contact: USCEA Conference Office; 202-293-0770; Telex: 7108249602; Fax: 202-785-4113.

Sept. 21-23 ***2nd International Conference on Training for Operation & Maintenance in the Nuclear Industry***
(The Moat House International Hotel, Stratford-upon-Avon, United Kingdom).
Sponsored by the Institution of Nuclear Engineers.
Contact: INE Conference Secretary; 081-698-1500 or 081-698-4750; Fax: 018-695-6409.

Sept. 29-Oct. 1 ***Crisis/Emergency Information Planners' Workshop*** (Loews L'Enfant Plaza, Washington DC)
Sponsored by the U.S. Council for Energy Awareness.
Contact: USCEA Conference Office; 202-293-0770; Telex: 7108249602; Fax: 202-785-4113.

Oct. 18-22 ***AMC Mining Convention*** (Las Vegas, Nevada)
Sponsored by the American Mining Congress.
Contact: AMC Convention Office; 202-861-2800; Fax: 202-861-7535.

Oct. 19-23 ***International Symposium on Geological Disposal of Spent Fuel, High-level and Alpha-bearing Wastes***
(Antwerp, Belgium).
Sponsored by the International Atomic Energy Agency.
Contact: IAEA, P.O. Box 100, A-1400 Vienna, Austria.

Nov. 15-18 ***International Nuclear Energy Forum*** (Fairmont Hotel, Chicago, Illinois).
Sponsored by the U.S. Council for Energy Awareness.
Contact: USCEA Conference Office; 202-293-0770; Telex: 7108249602; Fax: 202-785-4113.

Nov. 15-20 ***American Nuclear Society Winter Meeting*** (McCormick Center Hotel, Chicago, Illinois).
Contact: ANS Meetings Department; 708-352-6611.

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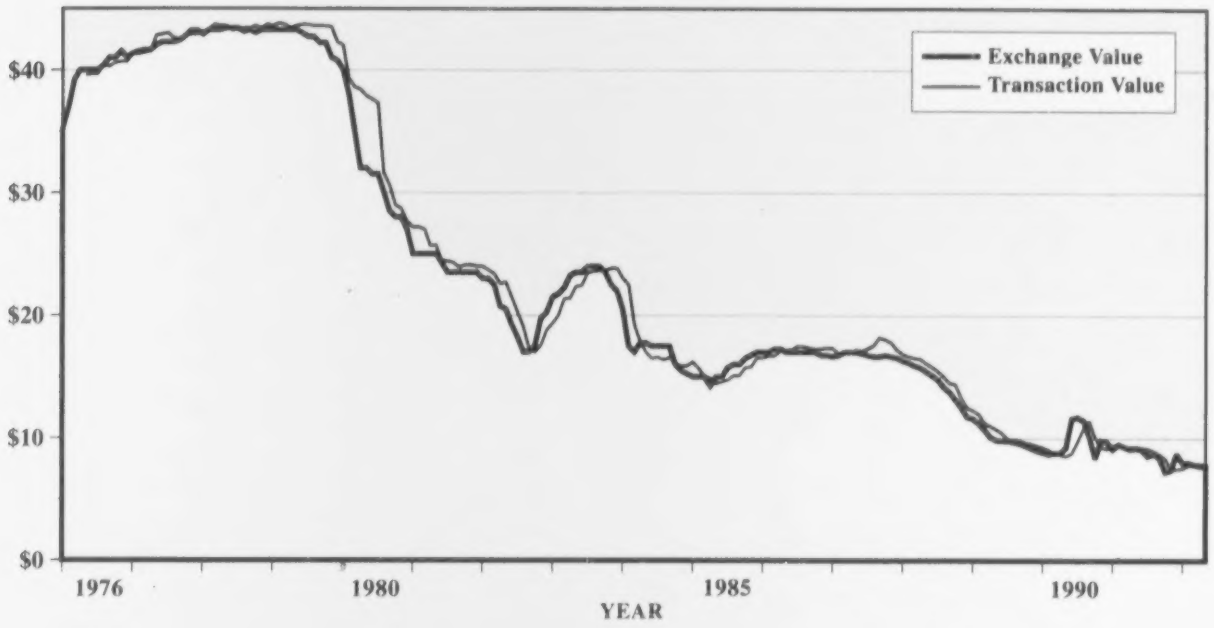
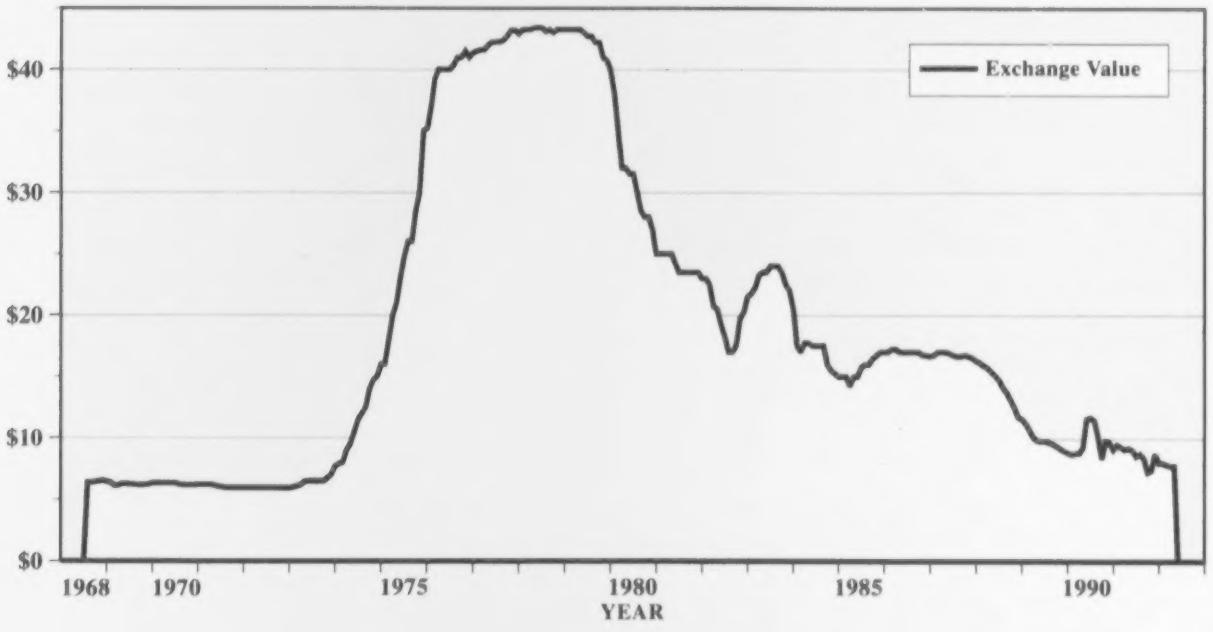
HISTORICAL MARKET DATA

NUEXCO HISTORICAL EXCHANGE VALUE AND TRANSACTION VALUE

(in US dollars per pound U_3O_8)





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HISTORICAL MARKET VALUES

Exchange Values

Year	Determined as of the last day of the month indicated ($US/lb U_3O_8)											
	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec
1968	—	—	—	—	—	—	—	6.35	6.35	6.40	6.45	6.50
1969	—	6.35	6.10	6.10	6.25	6.25	6.20	6.20	6.15	6.15	6.15	6.20
1970	6.30	6.30	6.30	6.30	6.30	6.30	6.30	6.20	6.15	6.15	6.15	6.15
1971	6.20	6.20	6.20	6.20	6.15	6.05	6.00	5.95	5.95	5.95	5.95	5.95
1972	5.95	5.95	5.95	5.95	5.95	5.95	5.95	5.95	5.95	5.95	5.95	5.95
1973	5.95	6.00	6.10	6.20	6.45	6.50	6.50	6.50	6.50	6.50	6.75	7.00
1974	7.70	7.90	8.00	9.00	9.50	10.50	11.50	12.00	12.50	14.00	14.75	15.00
1975	16.00	16.00	18.00	20.00	21.00	23.00	24.70	26.00	26.00	28.50	30.00	35.00
1976	35.20	37.00	39.25	40.00	40.00	40.00	40.00	40.40	41.00	41.00	41.50	41.00
1977	41.35	41.50	41.60	41.60	42.00	42.25	42.25	42.25	42.40	42.75	43.20	43.20
1978	42.90	43.25	43.25	43.25	43.40	43.40	43.40	43.10	43.25	43.00	43.25	43.25
1979	43.25	43.25	43.25	43.25	43.25	43.00	42.70	42.70	42.20	42.20	41.00	40.75
1980	40.00	38.00	35.00	32.00	32.00	31.50	31.50	30.00	28.50	28.00	28.00	27.00
1981	25.00	25.00	25.00	25.00	25.00	24.25	23.50	23.50	23.50	23.50	23.50	23.50
1982	23.00	23.00	22.50	20.75	20.50	19.25	18.25	17.00	17.00	17.50	19.75	20.25
1983	21.50	21.75	22.25	23.25	23.50	23.50	24.00	24.00	24.00	23.50	22.50	22.00
1984	20.50	17.50	17.00	17.75	17.75	17.50	17.50	17.50	17.50	16.00	15.50	15.25
1985	15.00	15.00	15.00	14.25	15.00	15.00	15.75	16.00	16.00	16.50	16.75	17.00
1986	17.00	17.00	17.25	17.25	17.00	17.00	17.00	17.00	17.00	17.00	16.75	16.75
1987	16.65	16.75	17.00	17.00	17.00	16.90	16.75	16.65	16.65	16.75	16.65	16.55
1988	16.30	16.15	15.90	15.75	15.40	15.10	14.75	14.15	13.75	13.15	12.50	11.75
1989	11.60	11.20	10.70	10.10	9.85	9.80	9.80	9.70	9.60	9.40	9.20	9.00
1990	8.85	8.70	8.80	8.80	9.25	11.60	11.70	11.45	10.10	8.35	9.80	9.70
1991	9.10	9.50	9.30	9.10	9.20	9.05	8.55	8.75	8.40	7.25	7.40	8.75
1992	8.00	8.00	7.85	7.75	7.75	**7.75**						

US Premium (Relative to the Exchange Value)

Year	Determined as of the last day of the month indicated ($US/lb U_3O_8)											
	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec
1986	—	—	—	—	—	—	—	—	—	—	0.65	0.75
1987	0.85	1.00	1.50	1.50	0.90	0.60	2.50	2.35	2.10	1.65	0.85	0.65
1988	0.70	0.50	0.15	0.25	0.60	0.00	0.00	0.00	0.00	0.00	**Discontinued**	

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HISTORICAL MARKET DATA

UF_6 Values

Year	Determined as of the last day of the month indicated ($US/kg U as UF_6)											
	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec
1985	—	—	—	40.50	42.50	42.50	44.00	44.50	44.50	46.00	46.00	47.00
1986	47.00	48.00	48.00	48.50	48.25	48.25	48.25	48.00	48.00	48.00	48.00	47.75
1987	47.75	48.00	48.00	48.00	47.75	47.75	47.50	47.00	46.75	47.00	47.00	47.00
1988	46.50	46.00	45.50	45.25	44.75	44.00	42.75	41.00	40.75	39.00	37.50	35.50
1989	34.75	34.00	33.00	30.50	30.25	30.25	30.00	29.75	29.75	28.25	27.75	26.50
1990	25.90	25.25	24.40	24.40	25.50	32.00	32.50	32.25	29.50	24.75	28.75	28.75
1991	27.50	27.75	27.50	27.25	27.60	27.25	25.75	26.25	25.50	22.75	22.75	26.00
1992	24.50	24.25	24.00	23.75	23.60	**23.60**						

US Premium (Relative to the UF_6 Value)

Year	Determined as of the last day of the month indicated ($US/kg U as UF_6)											
	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec
1986	—	—	—	—	—	—	—	—	—	—	2.50	2.50
1987	2.50	2.50	3.50	3.00	2.25	1.75	6.50	6.00	4.25	3.10	2.25	2.00
1988	1.25	1.25	0.50	0.50	1.00	0.00	0.00	0.00	0.00	0.00	**Discontinued**	

Conversion Values

Year	Determined as of the last day of the month indicated ($US/lb U as UF_6)											
	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec
1981	1.20	1.20	1.20	1.40	1.15	1.15	1.15	1.10	1.10	1.10	1.20	1.20
1982	1.20	1.20	1.20	1.20	1.00	1.00	1.00	0.90	1.10	1.60	1.45	1.45
1983	1.20	1.40	1.40	1.20	1.20	1.20	1.10	1.10	1.00	0.60	0.60	0.60
1984	0.60	0.30	0.80	0.80	0.80	0.00	0.00	0.80	1.00	1.00	0.80	0.80
1985	1.00	1.00	1.00	1.50	1.50	1.60	1.60	1.60	1.60	1.60	1.60	1.60
1986	1.60	1.80	1.90	1.80	1.80	1.80	1.80	1.90	1.90	1.90	1.80	1.80
1987	1.80	1.80	1.80	1.80	1.80	1.80	1.90	1.90	1.90	1.90	1.90	1.90
1988	1.90	1.80	1.80	1.80	1.80	1.80	1.85	1.95	1.95	1.95	1.95	1.95
1989	1.95	1.95	1.95	1.95	1.95	1.95	1.95	1.90	1.90	1.80	1.75	1.65
1990	1.50	1.50	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45
1991	1.45	1.45	1.45	1.45	1.50	1.50	1.50	1.60	1.55	1.55	1.55	1.55
1992	1.60	1.60	1.60	1.60	1.60	**1.50**						

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Transaction Values

Determined as of the last day of the month indicated ($US/lb U_3O_8)

Year	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec
1976	—	—	—	—	39.60	39.70	39.70	40.40	40.30	40.60	40.70	40.70
1977	41.30	41.30	41.40	41.50	42.80	42.90	43.00	42.60	42.50	42.80	42.90	42.90
1978	43.10	43.30	43.70	43.60	43.60	43.20	43.30	43.40	43.40	43.60	43.40	43.70
1979	43.60	43.80	43.70	43.40	43.60	43.70	43.70	43.60	43.60	43.60	43.50	42.30
1980	42.00	39.30	38.60	38.40	37.90	37.60	37.30	31.60	30.60	29.00	28.70	27.70
1981	27.20	27.20	27.00	25.70	25.70	24.50	24.40	24.30	23.90	24.10	24.10	24.00
1982	24.00	23.70	23.40	22.60	22.70	21.50	20.30	19.10	17.30	17.00	17.55	18.80
1983	19.35	20.00	21.35	21.40	22.35	22.45	23.50	23.60	23.65	23.65	23.85	23.85
1984	23.05	22.50	19.25	17.90	17.00	16.50	16.60	16.40	16.55	16.05	15.90	15.90
1985	16.20	15.70	15.05	14.90	14.45	14.60	14.75	15.10	15.10	15.75	15.80	16.55
1986	16.55	16.70	16.70	17.10	17.15	17.20	17.50	17.45	17.35	17.25	17.30	17.35
1987	17.35	16.90	16.95	17.00	17.20	17.10	17.30	17.55	18.20	18.05	17.80	17.20
1988	16.85	16.65	16.55	16.45	16.10	15.80	15.45	15.00	14.50	14.40	13.30	12.50
1989	12.25	12.00	11.25	11.00	10.75	10.45	9.95	9.80	9.80	9.65	9.55	9.40
1990	9.25	9.05	8.75	8.65	8.55	8.80	9.75	10.80	11.40	10.10	9.30	9.15
1991	9.40	9.45	9.35	9.30	9.30	9.20	9.15	8.95	8.70	8.35	7.45	7.50
1992	7.55	7.80	7.95	7.90	7.85	**7.80**						

SWU Values

Determined as of the last day of the month indicated ($US per SWU)

Year	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec
1986	80	80	80	80	75	78	78	78	78	78	80	80
1987	80	80	77	77	75	73	75	75	73	69	73	73
1988	73	73	70	68	68	68	68	65	65	65	65	65
1989	65	67	67	67	66	66	66	65	63	59	57	54
1990	54	50	50	50	50	50	50	50	50	51	51	51
1991	51	50	52	52	54	59	66	67	67	68	68	70
1992	71	70	69	67	65	**65**						

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HISTORICAL MARKET DATA

Loan Rates

Year	Determined as of the last day of the month indicated (Percent per Annum)											
	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec
1968	—	—	—	—	—	—	—	4.00	4.00	4.00	4.00	4.00
1969	4.00	4.00	5.00	5.00	5.00	5.00	5.00	5.00	6.00	6.00	6.00	6.00
1970	6.00	6.20	6.40	6.50	6.50	6.50	6.50	5.00	6.50	6.00	5.50	5.50
1971	5.00	4.75	4.75	4.75	5.00	5.25	5.25	5.25	5.25	5.25	4.50	4.50
1972	4.00	4.00	4.00	4.50	4.50	4.50	5.00	5.00	5.00	5.00	5.00	5.00
1973	5.50	5.50	5.75	5.75	6.00	6.25	7.00	7.00	7.00	7.00	7.50	8.00
1974	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00
1975	8.00	7.00	7.00	7.00	7.00	6.50	6.50	6.50	6.50	6.50	6.50	6.50
1976	6.50	6.50	6.50	6.50	*	*	*	*	*	*	*	*
1977	*	*	*	*	6.50	6.50	6.50	6.75	7.25	7.25	7.25	7.25
1978	7.25	7.00	7.00	7.00	7.00	7.50	7.75	7.75	7.75	7.00	7.00	7.00
1979	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00
1980	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00
1981	7.00	7.00	7.00	7.00	7.00	5.50	5.50	5.50	5.50	6.00	6.00	6.00
1982	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00
1983	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00
1984	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00
1985	6.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
1986	5.00	5.00	5.00	5.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
1987	3.00	3.00	3.00	3.00	3.00	3.00	3.00	4.00	4.00	4.00	3.50	3.50
1988	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
1989	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
1990	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
1991	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.00
1992	3.00	3.00	3.00	3.00	3.00	**3.00**						

* Float with Prime Rate

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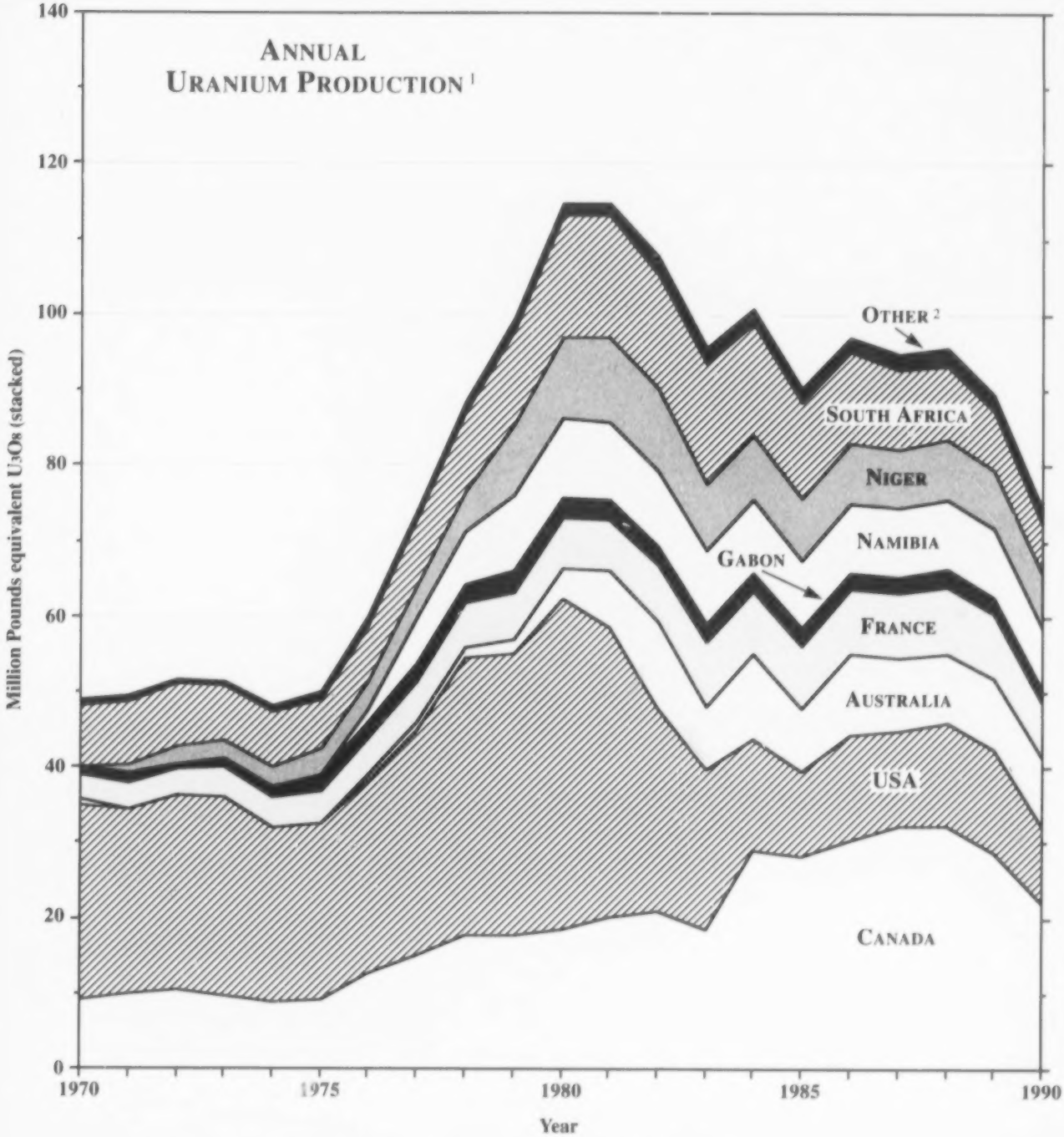

[1] Estimated western world uranium production in 1990 totalled 74.5 million pounds equivalent U_3O_8 —
(Australia: 9.1 – Canada: 22.0 – France: 7.4 – Gabon: 1.8 – Namibia: 8.0 – Niger: 7.4 – South Africa: 6.4 – USA: 10.2 – Other [2]: 2.2)

[2] **Other** includes: Argentina, Belgium, Brazil, India, Pakistan, Portugal, Spain, former West Germany, and Yugoslavia (Slovenia)

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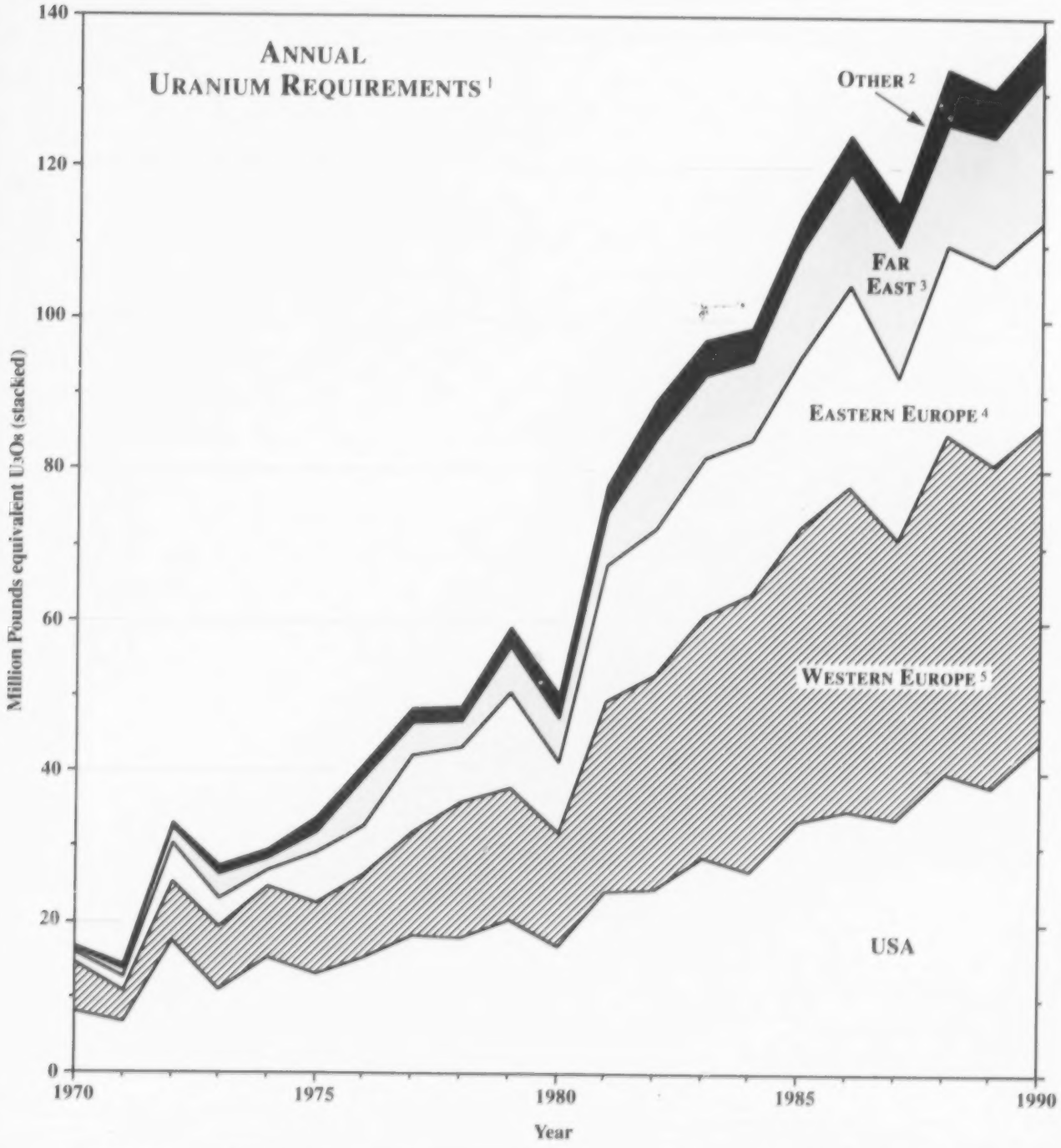
HISTORICAL MARKET DATA



[1] Calculated by NUEXCO based on actual completion dates and operating performance, and NUEXCO's estimate of enriching tails assay.
[2] **Other** includes: Argentina, Brazil, Canada, India, Mexico, Pakistan, and South Africa.
[3] **Far East** includes: Japan, People's Republic of China, South Korea, and Taiwan.
[4] **Eastern Europe** includes: Bulgaria, Czechoslovakia, former East Germany, Finland, Hungary, former Soviet Union, and Yugoslavia (Slovenia).
[5] **Western Europe** includes: Belgium, France, former West Germany, Italy, The Netherlands, Spain, Sweden, Switzerland, and UK.

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Australia

Year	Period [1]	Consumer Price Index [2] (1989/1990 = 100)	Price Index of Materials Used in Manufacturing Industry — All Groups [3] (1984/1985 = 100)	Average Weekly Ordinary Time Earnings — Adult Males — Australia [4] (Australian dollars)	Award Rates of Pay Indexes Australia - Adult Males In Mining Wage Earners, Weekly Rates [5] (June 1985 = 100)
1980	Avg.	47.4	83.1	—	69.6
1981	Avg.	51.9	85.9	—	76.1
1982	Avg.	57.7	89.0	—	86.4
1983	Avg.	56.9	96.9	—	89.9
1984	Avg.	66.0	98.0	—	96.0
1985	Avg.	70.5	107.3	—	100.0
1986	Avg.	76.9	101.5	—	104.9
1987	Avg.	83.4	108.9	465.88	112.9
1988	Avg.	89.4	111.8	496.90	115.4
1989	Avg.	96.2	117.0	534.65	126.0
1990	Avg.	103.2	123.4	571.43	129.7
1991	Avg.	106.5	120.1	600.35	133.7R
Jan	1991	—	125.6	—	133.0
Feb	1991	—	121.5	597.70	133.0
Mar	1991	105.8	119.1	—	133.3
Apr	1991	—	117.6	—	133.3R
May	1991	—	117.8	592.00	133.4R
June	1991	106.0	120.4	—	133.4R
July	1991	—	120.4	—	133.4R
Aug	1991	—	119.9	599.50	133.8R
Sept	1991	106.6	118.3	—	134.2
Oct	1991	—	118.7	—	134.3R
Nov	1991	—	120.6	612.20	134.4
Dec	1991	107.6	121.2	—	134.5R
Jan	1992	—	120.9	—	134.7R
Feb	1992	—	120.9	625.20	134.7
Mar	1992	107.6	120.0	—	134.8
Apr	1992	—	120.5	—	134.8

P = Preliminary **R** = Revised since last month

[1] Monthly data for the period 1967 to 1990 appears in NUEXCO Monthly Report 278.

[2] Weighted average of six State capital cities (1975 to 1980), and eight capital cities from 1981 (Base: Financial year July 1989 to June 1990 = 100.0). Figures shown at end of quarter represent quarterly average. Base year changed from 1980/81 in Monthly Report 286.

[3] Australian Bureau of Statistics, Canberra: "Price Index of Materials Used in Manufacturing Industry" (CATALOGUE No. 6411.0).

[4] Australian Bureau of Statistics, Canberra: "Award Rates of Pay Indexes, Australia" (CATALOGUE No. 6312.0). Figures for the latest fourteen months shown are subject to revision.

[5] Australian Bureau of Statistics, Canberra: "Average Weekly Earnings, States & Australia" (CATALOGUE No. 6302.0).

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GOVERNMENT STATISTICS

Canada

Year	Period	Industrial Products Price Index: All Commodities [1] (1986 = 100) [2]	Consumer Price Index: All Items (1986 = 100) [3]	Wage-earner Data: Average Hourly Earnings (C$) [4] Uranium Mines (SIC 057)	Metal Mines (SIC 061)	Mines, Quarries and Oil Wells (SIC 061-092)	Metal Rolling, Casting and Extruding (SIC 299)	Chemicals and Chemical Products Industries (SIC 371-379)
1980	Avg.	75.9	67.2	—.—	—.—	—.—	—.—	—.—
1981	Avg.	83.6	75.5	—.—	—.—	—.—	—.—	—.—
1982	Avg.	89.0	83.7	—.—	—.—	—.—	—.—	—.—
1983	Avg.	92.1	88.5	17.22	14.98R	14.58R	10.17R	11.03R
1984	Avg.	96.3	92.4	17.89	15.92R	15.29R	10.59R	11.67R
1985	Avg.	99.0	96.0	18.53	16.35R	15.83R	11.54R	12.14R
1986	Avg.	100.0	100.0	19.38	16.67R	15.98R	12.20R	12.65R
1987	Avg.	102.8	104.4	20.12	16.90R	16.25R	13.04R	13.22R
1988	Avg.	107.2	108.6	20.91	18.14R	17.22R	13.58R	13.72R
1989	Avg.	109.4	114.0	21.97	19.05R	18.37R	14.02R	14.31R
1990	Avg.	109.7	119.4	22.90	19.94R	19.11R	14.88R	15.13R
1991	Avg.	108.6R	126.2	24.35	21.45R	20.59R	14.94R	16.22R
Jan	1991	111.1	125.0	23.79	20.86R	19.94R	14.86R	15.51R
Feb	1991	110.6	125.0	25.23	21.39R	20.39R	14.82R	15.84R
Mar	1991	109.8	125.5	24.19	21.26R	20.57R	15.50R	16.19R
Apr	1991	109.1	125.5	24.77	21.22R	20.57R	14.76R	16.28R
May	1991	108.6	126.1	24.38	21.01R	20.51R	15.04R	16.26R
June	1991	108.5	126.7	23.58	20.96R	20.10R	14.67R	16.25R
July	1991	108.2	126.8	24.70	21.22R	20.17R	14.52R	16.07R
Aug	1991	107.8	126.9	23.78	22.56R	20.96R	14.72R	16.01R
Sept	1991	107.6	126.7	24.23	21.44R	20.61R	14.95R	16.40R
Oct	1991	107.3	126.5	24.40	21.68R	20.80R	15.13R	16.43R
Nov	1991	107.3R	127.0	24.58	21.83R	21.05R	15.00R	16.46R
Dec	1991	107.2R	126.4	24.53	21.99R	21.39R	15.30R	16.92R
Jan	1992	107.2	127.0	24.79	22.01R	21.48R	15.78R	16.91R
Feb	1992	108.0	127.1	24.42	21.87R	21.41R	16.18R	16.82R
Mar	1992	108.2	127.5	24.92	21.97R	21.37R	16.31R	16.62R
Apr	1992	108.0R	127.6	** [5]	22.13P	21.95P	16.53P	16.52P
May	1992	108.5	127.8	**	—.—	—.—	—.—	—.—

P = Preliminary **R** = Revised since last month

[1] Statistics Canada, Prices Division, Ottawa: "Industry Price Indexes" (CATALOGUE 62-011). Indexes for the most recent six months shown are subject to revision. This category was formerly known as "Manufacturing." Monthly data for the period 1967 to 1990 is found in NUEXCO Monthly Report 278.

[2] New Base Year of 1986 as of NUEXCO Monthly Report 266. Previous Base Year was 1981.

[3] New Base Year of 1986 as of NUEXCO Monthly Report 264. Previous Base Year was 1981.

[4] Statistics Canada, Labour Division, Employment and Payrolls Section, Ottawa: "Employment, Earnings and Hours." Monthly data for the period 1983 to 1990 is found in NUEXCO Monthly Report 278. SIC number revisions shown starting in Monthly Report 287.

[5] As of April 1992, Statistics Canada no longer provides specific information on uranium mine wages. The data has been included with Metal Mines (SIC 061).

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South Africa

Year	Period	Average Declared Working Costs per Metric Ton of Gold Ore Milled [1] (Rand)	Tonnage-Weighted Index of Average Working Costs per Metric Ton of Gold Ore Milled [2] (March 1982 = 100)	Consumer Price Index [3] (1990 = 100)	Production Price Index All Groups [4] (1990 = 100)	Total Employment in Mining and Quarrying [5]	Total Salaries and Wages in Mining and Quarrying [5] (1,000 Rand)
							Annual Total [6]
1980	Avg.	35.50	—	25.5	27.7	709,042	2,237,689
1981	Avg.	41.87	—	29.4	31.5	722,918	2,756,928
1982	Avg.	47.23	103.9	33.7	35.9	702,041	3,181,584
1983	Avg.	51.88	115.0	37.8	39.7	700,901	3,563,282
1984	Avg.	58.95	130.3	42.2	43.0	711,511	4,134,390
1985	Avg.	68.70	151.7	49.1	50.3	724,587	4,778,612
1986	Avg.	80.18	177.9	58.2	60.1	756,637	5,767,950
1987	Avg.	95.01	223.1	67.6	68.5	751,864	6,911,395
1988	Avg.	106.69	241.1	76.2	77.5	705,355	7,774,054
1989	Avg.	116.65	273.0	87.4	89.3	700,360	8,833,934
1990	Avg.	129.37	305.3	100.0	100.0	677,742	10,193,209
1991	Avg.	136.06	322.4	115.1 R	111.4	630,722	10,934,073
							Monthly Total
Jan	1991	—	—	107.7	108.6	648,944	935,839
Feb	1991	—	—	109.0	109.0	650,948	893,373
Mar	1991	137.66	323.82	110.0	108.2	651,843	924,930
Apr	1991	—	—	111.5	108.8	639,939	887,722
May	1991	—	—	113.2	109.8	630,481	887,107
June	1991	134.65	317.23	114.0	110.3	640,908	890,595
July	1991	—	—	115.5	111.2	637,581	881,182
Aug	1991	—	—	117.1	112.0	633,699	963,710
Sept	1991	137.11	329.05	118.7	113.2	639,535	1,014,424
Oct	1991	—	—	119.8	114.8	584,435	860,529
Nov	1991	—	—	120.9	115.3	602,461	853,864
Dec	1991	134.81	319.33	123.8 R	115.8	602,486	940,798
Jan	1992	—	—	125.1	115.9	—	—
Feb	1992	—	—	126.2	116.3	—	—
Mar	1992	139.69	331.46	127.3	116.9	—	—
Apr	1992	—	—	128.9	118.4	—	—
May	1992	—	—	129.9	—	—	—

P = Preliminary **R** = Revised since last month

[1] Chamber of Mines of South Africa, Johannesburg: "Analysis of Working Results," published quarterly. Historical Data by month appears in NUEXCO Monthly Report 278.

[2] Page 16 of Report 178 contains description and calculation of index.

[3] Central Statistical Service, Pretoria: All income groups-weighted average, Historical Data by month appears in NUEXCO Monthly Report 278.

[4] Central Statistical Service, Pretoria: All commodities for consumption in South Africa. Base Year changed from 1985 to 1990 in NUEXCO Monthly Report 284.

[5] Central Statistical Service, Pretoria: Historical Data by month appears in NUEXCO Monthly Report 236.

[6] Annual total is shown, rather than monthly average, for indicated year.

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GOVERNMENT STATISTICS

United States

Year	Period	Producer Price Index [1] Industrial Commodities (1982 = 100)	Producer Price Index [1] All Commodities (1982 = 100)	Consumer Price Index [2] (1982-1984 = 100)	GNP Implicit Price Deflator [3] (1987 = 100)	Gross Average Hourly Earnings of Production or Non-supervisory Workers (US$) [4] Metal Mining (SIC 10)	Primary Non-ferrous Metals (SIC 333)	Chemicals and Allied Products (SIC 28)	Electric and Electronic Equipment (SIC 36)
1980	Avg.	88.0	89.8	82.4	71.7	10.26	10.63	8.31	6.94
1981	Avg.	97.4	98.0	90.9	78.9	11.55	11.98	9.12	7.62
1982	Avg.	100.0	100.0	96.5	83.8	12.31	12.93	9.96	8.21
1983	Avg.	101.1	101.3	99.6	87.2	12.58	13.43	10.58	8.66
1984	Avg.	103.3	103.7	103.9	91.0	13.05	13.43	11.07	9.04
1985	Avg.	103.7	103.2	107.6	94.4	13.38	13.74	11.57	9.46
1986	Avg.	100.0	100.2	109.6	96.9	12.46	13.48	11.98	9.65
1987	Avg.	102.6	102.8	113.6	100.0	12.52	12.98	12.37	9.88
1988	Avg.	106.3	106.9	118.3	103.9	13.24	13.26	12.71	9.79
1989	Avg.	111.6	112.2	124.0	108.4	13.59	13.72	13.09	10.05
1990	Avg.	115.8	116.3	130.7	112.9	14.10	14.36	13.54	10.32
1991	Avg.	116.5	116.5	136.2	117.0	14.89	14.64	14.07	10.73
Jan	1991	119.3	119.0	134.6	—	14.73	14.63	13.85	10.60
Feb	1991	117.2	117.2	134.8	—	14.80	14.55	13.81	10.59
Mar	1991	115.6	116.1	135.0	115.9	14.93	14.55	13.85	10.55
Apr	1991	115.6	116.0	135.2	—	14.85	14.56	13.96	10.63
May	1991	116.1	116.5	135.6	—	14.79	14.52	14.01	10.66
June	1991	116.1	116.4	136.0	116.8	14.88	14.51	14.05	10.74
July	1991	116.0	116.1	136.2	—	15.09	14.56	14.16	10.77
Aug	1991	116.3	116.2	136.6	—	14.82	14.64	14.06	10.78
Sept	1991	116.3	116.1	137.2	117.4	15.04	14.59	14.21	10.84
Oct	1991	116.7	116.4	137.4	—	14.94	14.75	14.25	10.78
Nov	1991	116.7	116.4	137.8	—	15.29	14.89	14.27	10.88
Dec	1991	116.1	115.9	137.9	117.9	15.13	14.87	14.34	10.96
Jan	1992	115.7R	115.6	138.1	—	15.06	14.74	14.30	10.90
Feb	1992	116.0	116.1	138.6	—	15.22	14.67	14.29	10.90
Mar	1992	115.9	116.1	139.3	118.8	15.05R	14.57R	14.26R	10.92R
Apr	1992	116.3	116.3	139.5	—	15.05P	14.62P	14.39R	10.97R
May	1992	117.2	117.1	139.7	—	—·—	—·—	14.42P	10.97P

P = Preliminary R = Revised since last month

[1] US Bureau of Labor Statistics, Washington, DC: "Producer Prices and Price Indexes," (formerly "Wholesale Prices and Price Indexes"), Producer Price Indexes are revised four months after they are first released to reflect the availability of late reports and corrections by respondents Historical data is presented in NUEXCO Monthly Report 278.

[2] US Bureau of Labor Statistics, Washington, DC: Consumer Price Index for All Urban Consumers, US City Average, All Items. Historical data is presented in NUEXCO Monthly Report 278.

[3] US Department of Commerce, Washington, DC: Bureau of Economic Analysis, National Income and Wealth Division: "Survey of Current Business." The GNP Implicit Price Deflator is published quarterly, and seasonally adjusted. Historical data is presented in Report 278. Base Year change from 1982 to 1987 in NUEXCO Monthly Report 284.

[4] US Bureau of Labor Statistics, Washington, DC: "Employment and Earnings." All data based on 1972 revision of SIC Manual. Historical data is presented in NUEXCO Monthly Report 278.

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Uranium Deliveries To The European Community[1]

— Compiled from data published by the Euratom Supply Agency —

Year	Volume of Deliveries to the EC[2] (MTU)	Percentage of Deliveries Made Under Spot Contracts	Medium or Long-Term Contracts[3] Average Price		Spot Contracts[3] Average Price	
			in ECU per pound U_3O_8	in US Dollars per pound U_3O_8	in ECU per pound U_3O_8	in US Dollars per pound U_3O_8
1977	n/a	n/a	n/a	n/a	n/a	$41.00
1978	n/a	n/a	n/a	n/a	n/a	$43.00
1979	10,000	n/a	n/a	n/a	n/a	$44.50
1980	8,600	n/a	n/a	$36.00	n/a	$35.00
1981	13,000	less than 10	n/a	$33.25	n/a	$28.00
1982	12,500	less than 10	ECU 32.25	$32.00	ECU 24.25	$24.00
1983	13,500	less than 10	ECU 34.75	$31.00	ECU 26.00	$23.25
1984	11,000	less than 10	ECU 37.75	$29.75	ECU 24.50	$19.25
1985	11,000	11.5	ECU 38.00	$29.00	ECU 19.50	$15.00
1986	12,000	9.5	ECU 31.50	$31.00	ECU 18.00	$17.75
1987	14,000	17.0	ECU 28.25	$32.50	ECU 15.00	$17.25
1988	12,500	14.5	ECU 26.92	$31.82	ECU 13.65	$16.13
1989	13,500	11.5	ECU 26.63	$29.35	ECU 11.04	$12.19
1990	12,800	16.7	ECU 23.08	$29.39	ECU 7.60	$ 9.68

P = Preliminary **R** = Revised since last month

[1] The twelve European Community member nations are Belgium, Denmark, France, Germany, Greece, Ireland, Italy, Luxembourg, The Netherlands, Portugal, Spain, and the United Kingdom; prior to January 1986, Spain and Portugal were not members of the EEC.

[2] The only deliveries taken into account are those made to final users, namely the electric utilities or their procurement organizations; deliveries to middlemen or fuel cycle companies are not included. The sales between utilities in the Community are also excluded. The quantities covered are those which were entered into accounting records during the year stated.

[3] For deliveries made under medium or long-term contracts (i.e., for which the time between the date of signature and the date of the last delivery exceeds one year) the prices were expressed in seven different currencies. In order to calculate an average price, these prices have been converted into European Currency Units (ECU) and US dollars. The average prices were weighted by quantity and converted on the basis of the average annual exchange rate of the different currencies against the ECU and US dollar. Exchange rates are published by European Communities Statistical Office and the International Monetary Fund.

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GOVERNMENT STATISTICS

US Uranium Marketing Data

— Compiled from data published by the US Energy Information Administration [1] —

Year	Total Production (million pounds U_3O_8)	Deliveries to Domestic Utilities From US Suppliers [2] (million pounds U_3O_8)	Average Price of Delivered Uranium [2] ($/lb. U_3O_8)	Quantity of Uranium Imported [3] (million pounds U_3O_8)	Average Price of Imported Uranium ($/lb. U_3O_8)	Quantity of Uranium Exported (million pounds U_3O_8)
1976	25.5	27.6	$16.10	3.6	n/a	1.2
1977	29.9	27.8	$19.75	5.6	n/a	4.0
1978	37.0	31.6	$21.60	5.2	n/a	6.8
1979	37.5	33.0	$23.85	3.0	n/a	6.2
1980	43.7	35.0	$28.15	3.6	$43.10	5.8
1981	38.5	32.6	$34.65	6.6	$32.90	4.4
1982	26.9	23.5	$38.37	17.1	$25.19	6.2
1983	21.2	24.2	$38.21	8.2	$26.16	3.3
1984	14.9	22.5	$32.65	12.5	$21.86	2.2
1985	11.3	21.7	$31.43	11.7	$20.08	5.3
1986	13.5	18.9	$30.01	13.5	$20.07	1.6
1987	13.0	20.8	$27.37	15.1	$19.14	1.0
1988	13.1	17.6	$26.15	15.8	$19.03	3.3
1989	13.8	18.4	$19.56	13.1	$16.75	2.1
1990	8.9	20.5	$15.70	23.7	$12.55	2.0

P = Preliminary **R** = Revised since last month

[1] Sources: 1976-1983: US Department of Energy/Energy Information Administration, *Survey of United States Marketing Activity.*
1984-1990: Energy Information Administration, *Uranium Industry Annual.*

[2] Data for 1976-1981 includes both domestic utilities and agents.

[3] Includes imports by domestic utilities and domestic suppliers.

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